

	Route to	See page
1		
2		
3		
4		
5		
6		

Contractors and Engineers Monthly

Vol. 43, No. 3

MARCH, 1946

APR 2 1946

\$3 a Year, 25 Cents a Copy

Covering the Field

Tunnel and Canals Relined

An unusual job involving the relining of tunnel sections and canals with Gunitite and concrete to restore the full capacity of a hydroelectric system is described in the feature article on this page.

Bridge Construction

Of the two bridge projects described in this issue, one featured the precasting of 9,500 linear feet of reinforced-concrete piles for three structures in Georgia (page 1), while the other covers the construction of two bridges and four grade separations involved in the relocation of 2 miles of railroad line (page 42).

Bituminous Paving

Rock-asphalt surfacing of a 10-mile section of road as a maintenance contract (page 1); a new plant-mix top for 18 miles of highway, laid by state forces (page 72); and a new macadam access road (page 90) are the types of bituminous paving described in this issue.

New Concrete Highway

The relocation of 9.6 miles of main highway involved more than 1,000,000 yards of grading and 24-foot-wide concrete paving, with dual highway a part of the way. (See page 2.)

Concrete Siphon

As part of the Provo River Project in Utah, a 4,200-foot concrete siphon, with an 8-foot inside diameter, was built. The construction details are given on page 6.

County Road Work

Local materials were used to make possible the economical construction of a 10-mile stretch of road in a southern county (page 11). A survey of the conditions and problems met by counties in the southwest appears on page 63.

Care of Bearings

An important factor in maintaining equipment efficiency is the care and lubrication of ball and roller bearings. A comprehensive article on this subject on page 23 offers some helpful hints in maintaining trouble-free operation.

Snow Removal

An article on page 31 tells the story of the six-months-a-year battle with snow and ice in one of our western states and describes the equipment and organization used to win it.

Production of Aggregate

The quarry and 100-ton-an-hour crushing and screening plant which produced 50,000 tons of aggregate for a 6-mile road job are described on page 66.

Wood-Pile Dikes

Wood-pile dikes and timber mattresses are used by the U. S. Engineer Department in its program to maintain the navigation channel in the Mississippi River. See pages 85 for the details of their construction.

(You will find "In This Issue" on page 4)



C. & E. M. Photo
At H. G. Smith's pile-casting yard, a Rex 10-S mixed the concrete for the bridge piles, forms for which are seen in the background.

Piles Are Precast For Bridge Spans

Contractor's Plant Pours Six Every 10 Hours; Total Of 9,500 Linear Feet Used For Three Bridges

FOR the three concrete bridges to be constructed across the Ogeechee River and its overflow branches, Contractor H. G. Smith of Fitzgerald, Ga., set up a plant to precast 9,500 linear feet of reinforced-concrete piles which were driven in the five-pile bent construction of the new bridges. A contract for the construction of these three bridges, 256, 576, and 849 feet long, was awarded to H. G. Smith in December, 1944, by the State Highway Department of Georgia on his low bid of \$289,807.62. Work began on February 14, 1945, but heavy rains during the spring months hampered progress.

(Continued on page 96)

Rock Asphalt Used To Surface Highway

IN paving 10 miles of bituminous highway in Indiana last summer, contractor L. P. Cavett & Co. of Lockland, Ohio, found the man-power shortage so acute that girls were employed as flagmen to be stationed at each end of the job to maintain traffic, while the Superintendent's 16-year-old daughter filled in during her summer vacation as girl-of-all-work in various jobs from helping to set stakes as a guide for the bituminous paver, to driving a pick-up truck hauling tools and supplies. The paving project was a regular contract awarded by the Maintenance Division of the Indiana State Highway Commission to L. P. Cavett & Co. on its low bid of \$137,461 to improve the road surface on State Route 32 from the city limits of Crawfordsville east 10.11 miles to a point beyond Shannondale, lying mostly in Montgomery County with a small portion at the east end in Boone

Tunnel and Canals Relined With Gunitite and Concrete

By RAYMOND P. DAY,
Western Field Editor

TWENTY-FIVE years ago, when mule skinnners cursed all manner of long-eared progeny of doubtful parentage and private enterprise was respected as a part of our national institution, the Southern California Edison Co., Ltd., spent untold millions of dollars developing the hydroelectric resources of Kern River. Tunnels, flumes, and canals were built. The river was dropped 800 feet through steel penstock tubes to spend its force against 35,000-kw turbine vanes at the Kern River No. 3 plant. Further downstream it was sapped of its energy at river level near Borel. All its power was transmitted to light the homes and turn the wheels of industry throughout central and southern California.

Time has long since unleashed destructive forces which have taken their toll, and the once solid concrete linings were roughened and eroded by snow water from the high Sierras. When iron men with guts drove those tubes 3,000 feet above the level of the sea, the concrete they made was not as sound as we can make it now. So water had raveled the sides and reduced the carrying capacity as well as the kilowatt output of the hydroelectric system.

Once again the Southern California Edison Co. has spent money, \$500,000 this time, to give the old canal sides and bottom a new lining of up-to-date high-strength Gunitite. The job was located at Isabella, 50 miles northeast of Bakersfield, Calif. Tunnel sections were

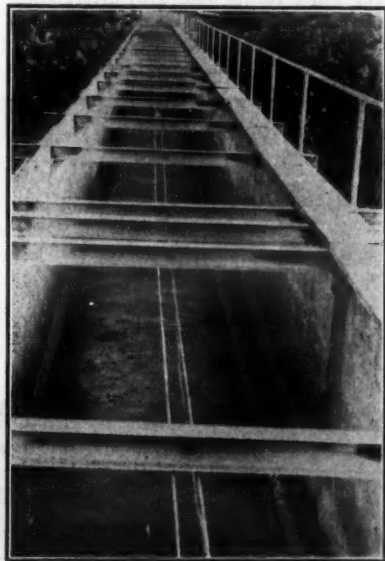
Full Capacity of Old Hydroelectric System Is Restored by Contract for Rehabilitation Work

repaired; nearly 23,700 linear feet of tunnel 8 feet 3 inches x 8 feet 6 inches was given new Gunitite lining on the sides and floor; and nine Lennon-type steel flumes which carry the Kern River on timber and steel supports were cleaned and repainted. The big 5 and 7-foot-diameter penstock tubes at the powerhouse above Kernville were flame-cleaned and brushed inside and given a new coat of coal-tar paint.

Officially the job was divided into two parts: repair of the Borel Canal and flumes; and cleaning, repairing, and application of protective coating to Kern River No. 3 tunnel and conduit. Completion of this project, which involved 1,246,000 square feet of surfacing by Gunitite and concrete, will not only protect the existing parts of the old system but will restore it to its original capacity.

The repair job of Guniting was as large an undertaking of this nature as Kern Valley has ever seen. Two contractors, Morrison-Knudsen Co., Inc., of Boise, Idaho, and the Vinson Construction Co. of Phoenix, Ariz., operating jointly, bid the job after a two-day inspection of the tunnel and canals. It was difficult to make a very accurate estimate of the work to be done, because the tunnel was wet and its sides were covered with algae-like scum. The job, which was awarded on a low bid of \$500,000, was completed on a low bid of \$475,000.

(Continued on page 17)



C. & E. M. Photo
Rehabilitation of tunnel and canals of the Kern River, Calif., hydroelectric system included Guniting the sides and bottom of open conduits. Here the work has been completed.

Laid on Binder Course of Pre-Mixed Stone Aggregate; Girls for Light Work Ease Man-Power Shortage

County.

This central-Indiana road was originally constructed with a two-course waterbound-macadam pavement, 7 inches thick, and had been given a bituminous surface treatment in 1941. Since then the road had become rough, broken, and its high crown undesirable for present-day motor traffic. Work began on the road early in May when its 20½-foot pavement was thoroughly cleaned of dirt, mud, and excess loose material by a power broom and blower.

After this preparation, the pavement was given a prime coat of RC-2 asphalt of 70-110 penetration, at the rate of 0.25 gal. per sq. yd.

(Continued on page 93)

Million Yards of Grading On Concrete Paving Project

One Company Awarded All Three Contracts on 9.6-Mile Highway Relocation; Dual Roadway Built Part of Way

By WILLIAM H. QUIRK,
Editor

★ THE William Penn Highway, U. S. 22, has been relocated for 9.6 miles between Harpers Tavern and Fredericksburg, in Lebanon County in southern Pennsylvania, with a 24-foot concrete pavement, widened at bridges and road intersections to a dual highway separated by a 4-foot median strip. Because of its size the project was divided into three contracts, but all were awarded to one company, the Potts & Callahan Construction Co. of Baltimore, Md., on low bids totaling \$2,302,587. Work on this new location was begun in December, 1944, and traffic began using the new highway late in 1945.

By-passing Ono, Jonestown, and Fredericksburg, the new road roughly parallels, at a distance varying from 800 feet to 1½ miles, the old road which was built over a period from 1922 to 1928 of 7-5-7 and 8-6-8-inch concrete in 20 and 22-foot widths. Some of these slabs were originally only 16 feet, but had since been widened 2 feet on each side to 20 feet. The new location replaces such undesirable features as cracked and broken pavement, sharp curves, heavy grades, and poor sight distances with their resultant hazards to safe driving, and eliminates bottlenecks in by-passing towns through which a new road could have been built only at great cost and difficulty.

Three Contracts

The first contract at the west end of the project began at Harpers Tavern, about 20 miles east of Harrisburg, at the intersection with State Route 443, and stretched eastward 3.35 miles. Included in the 24-foot pavement of 9-inch reinforced concrete is about 0.7 mile where the highway is widened to two 24-foot roadways separated by a 4-foot light-reflecting divisor. Also a part of this \$672,261 contract was the construction of a concrete rigid-frame 80-foot-span overpass, with stone masonry facing, carrying the William Penn Highway over State Route 443, with interchange ramps 12 to 24 feet wide; and two concrete arch bridges with 30 and 40-foot spans to carry the new highway over

two good-size streams.

The adjoining contract carried the construction 3.82 miles further east at a cost of \$1,225,752. Of this distance nearly 2½ miles are dual 24-foot roadways. This contract included three bridges with a total length of 533 feet, and six concrete arch culverts. One of the bridges is an interchange structure carrying U. S. 22 over State Route 72, an important coal-hauling route; one is an over-stream bridge spanning Swatara Creek; and the third is an overpass over the Reading railroad. Besides the length of pavement on the main road, an additional mile of concrete was constructed along State Route 72, and another road crossing the new location.

The third and last contract, bid price \$404,574, which ties in to the original U. S. 22 about a mile east of Fredericksburg, was 2.43 miles long and included two concrete structures. Of this distance a little over ½ mile was dual-roadway construction.

Grading

Before work could be started on the more than 1,000,000 cubic yards of grading for the new location, considerable clearing was done by units from the fleet of seventeen tractor-dozers which Potts & Callahan brought to the job. They included thirteen Caterpillars, nine D7's, two RD7's, one D9, and one RD8; two Internationals, a TD-14 and a TD-18; and two Allis-Chalmers, a WM and a WK. Large trees which could not be bulldozed from their stand were cut down by a Mall 36-inch power chain saw.

Practically all the material moved was shale containing a small percentage of free clay and mixed with rock in a few locations. The shale was generally found in vertical layers, causing trouble in cuts where the strata had a tendency to slide. Because of the size of the job, the contractor put all his available earth-moving equipment to work, including trucks loaded by shovels for hauls over 1,500 feet or when rock was found in the shale; rubber-tired self-powered Tournapulls on hauls from 700 to 1,500 feet; and scrapers pulled by crawler tractors for maximum hauls of 800 feet.

Working in the borrow pits and the heavy cuts were six Marion shovels, four 1½-yard, one 1¼-yard, and one 1¾-yard, which kept busy a fleet of fifty White 4-yard trucks. To help the

scrapers pick up their loads, the shale was loosened by two Slusser-McLean heavy-duty CR-2 rippers pulled by D7 tractors. Four LP Tournapulls of 12-yard capacity were loaded with the help of a D7 pusher tractor, and moved along at a speed as high as 14 mph. On the shorter hauls six 18-yard scrapers, three LaPlant-Choate and three Le-Tourneau, were pulled by Caterpillar D8 tractors.

The shale was spread in layers averaging 4 inches in depth, and compacted by sheepfoot rollers of which there were twelve dual sets on the job, including Trojan, LaPlant-Choate, Le-Tourneau, Euclid, Wayne, and Slusser-McLean units. They were usually pulled by rubber-tired tractors unless the ground was very wet; then two sets, hooked together, were pulled by a crawler tractor. Rubber-tired tractors on the job included five International Farmall Model M and three Case Model LA-1 tractors. The haul roads were kept smooth and in shape by constant attention from six Caterpillar No. 12 power graders, enabling the equipment to maintain top speed in moving earth. Final compaction was done by three 10-ton 3-wheel rollers, two Galions and a Huber.

The shale provided a substantial sub-base for the concrete pavement on all but the third and most easterly contract where the shale had decomposed to such a degree that it had to be removed and a 6-inch layer of slag laid in its place. The slag was obtained from the Bethlehem Steel Co. plant at Lebanon, Pa., and was excavated from a slag bank by a Marion 1½-yard shovel and hauled 10 miles to the project in ten of the 4-yard White trucks, and three hired International 15-ton coal trucks which were paid for by the load. Dumped from the trucks, the slag was spread over the road and the large pieces were pulverized by the 10-ton rollers. The slag was laid to a width of 26 feet, or 1 foot outside each edge of the pavement, after which 1 inch of stone screenings was added to facilitate sub-grading and prevent loss of mortar.

Although only about 3.5 miles of the 9.6 miles of U. S. 22 were paved with two 24-foot roadways, the grading operations extended the full width for the entire distance. The north, or west-bound, roadway will be completed at some future date and will be separated from the recently laid south, or east-bound, roadway by a continuation of the 4-foot median strip.

At the eastern end of the project, beyond Fredericksburg, 600 feet of existing pavement was removed in order to make a junction with the new location. The concrete was broken up by a 2,000-pound weight dropped from the 35-foot boom on a Lima crane, and the steel-mesh reinforcement was cut with nippers. One of the shovels removed the concrete rubble and enough sub-



C. & E. M. Photo
A Link-Belt crane with a 50-foot boom and 10-foot jib places form panels on the Swatara Creek Bridge.

base to make room for 6 inches of slag on which the new concrete pavement was laid.

Drainage

Drainage was given plenty of attention on this William Penn Highway, with a total of 59,600 linear feet of sub-grade drains, having a minimum depth of 6 inches and a width of 15 inches, installed under the pavement. In addition, the job contains 55,200 linear feet of 4-inch tile drain installed in the ditch lines through all cut sections. This has the important function of intercepting side drainage and providing an outlet for subgrade drains under the slab. Stone subgrade drains were placed on the upper side of each joint, spaced at 61-foot intervals, to intercept any water seeping underneath the slab and lead it to the shoulder area where it is carried in special tile outlets to parallel intercepting tile underdrains in cuts or is deposited on the slope in fills.

The 24-foot pavement has a center crown of ⅜ inch per foot, while the shoulders in the cuts slope 1½ inches to the foot, and in the fills ½ inch to the foot. The trenches through the shoulders were dug by hand.

Laying Road Forms

About 14,000 feet of Blaw-Knox steel road forms were available on this job, with 1,000 feet usually set ahead of the day's pour, and never dropping below 500 feet as the paving progressed. A Cleveland Formgrader dug the trench for the forms, which were placed by four form setters assisted by ten laborers who did the preliminary work of assembling the forms to rough line and grade. The pins were driven by a Cleveland form-pin hammer powered by a Worthington 105-cfm portable compressor, and were removed 24 hours after the pour by a Cleveland pin puller and a crew of five men who loaded them on a flat-bed truck for hauling to the next location. Another flat-bed truck distributed the expansion and construction joints and the necessary pins for their support.

When the forms were carefully set for a 12-foot lane and tamped by a Lakewood form-tamping machine, a Buckeye R-B Finegrader rode over them, throwing excess material from the grade over to the sides where it was used on the shoulders. A Cleveland scratch template was then pulled over the form to check the grade, and any necessary adjustments were made by a crew of five who followed behind with shovels. One of the Caterpillar power graders was kept with the fine-grade crew to be available for any sizable cutting. The grade was then rolled by a Fordson 5-ton 3-wheel roller, and checked again with another scratch template to make sure that the full 9-inch depth was obtained. This last scratch board just preceded the paver and was accompanied by three men who checked the forms as well as the grade.

(Continued on page 82)



C. & E. M. Photo
Potts & Callahan's batching plant for paving 9.6 miles of the William Penn Highway consisted of a 300-barrel Blaw-Knox cement bin, at left; a B-K three-compartment aggregate bin; and a Marion crane with a 60-foot boom and a Williams clamshell to load the bin.

New Worcester Municipal Airport has shock-absorbing Texaco runways



Heavy-duty Texaco Asphaltic Concrete paving, 4 inches thick and 150 feet wide, serves the three runways of Worcester's Municipal Airport.



Laying Texaco Asphaltic Concrete wearing surface on Worcester airport runways.



Crowd greets the first plane to land at the new Worcester Municipal Airport.

Worcester, Mass., again demonstrates why it is recognized as one of New England's most progressive cities. Long aware of the boom in air transportation which would follow the war, Worcester carefully prepared its plans, which have now materialized in the city's modern new airport.

The three runways of Worcester's airport range from 3,750 to 5,500 feet in length. They are supported by a gravel base 14 inches thick, on which is laid 4 inches of bituminous penetration macadam. The wearing surface consists of a 4-inch thickness of resilient, heavy-duty Texaco Asphaltic Concrete paving, laid in two courses.

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Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

Member of Controlled Circulation Audit

Issued Monthly by Bittenheim-Dix Publishing Corp.

Editorial and Business Office: 470 Fourth Ave., New York 16, N. Y.

Acceptance under the Act of June 5, 1934, at Mount Morris, Illinois,
authorized March 26, 1945.

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Theodore Reed Kendall

The highway and heavy-construction industry lost a true friend with the death last month of Theodore Reed Kendall, Editor of CONTRACTORS AND ENGINEERS MONTHLY for the past twenty-five years. "Ted" Kendall, as he was generally known throughout the industry, in turn had friends in every state of the nation where he traveled far and wide covering construction projects to give his readers the detailed facts of how and with what the job was done. He had an alert, inquiring mind, with a passion for details, and was never satisfied until he had thoroughly familiarized himself with every feature of the project he was reporting so that he could pass on this information for the benefit of others. In the back of his mind was the watchword "Service to Readers" and to this end he devoted the major part of his life.

He was the dean of construction magazine editors at the time of his death, and had been the pioneer in the step-by-step manner of presenting a construction story so that anyone would know precisely how the job was done and could, as he put it, "go out and do the same, even knowing exactly what tools and materials were needed". Thoroughly familiar with the problems of

construction men, his wide knowledge was constantly sought for advice and counsel, and he was never happier than when he could pass on the fruits of his experience for the guidance and assistance of others.

His charm, geniality, ready wit, and skill as a raconteur made him a legion of friends with whom he retained contact down through the years. His mailing list for Christmas cards, numbered in many hundreds, included mostly those men whom he had met on his travels, from construction laborers on through the lines of foremen, superintendents, contractors, engineers, and commissioners. His cheery smile made him welcome wherever he went on his many field trips, on all of which he embarked with the enthusiasm and exuberance of a man who loves his work.

Theodore Reed Kendall was eagerly awaiting the start of the coming construction season which he expected to be one of the largest in the history of the country. His plans, based on the groundwork he laid so well over the past twenty-five years, were "to continue with every means possible to serve the readers of CONTRACTORS AND ENGINEERS MONTHLY". Our future objective cannot be better stated.

Highways and People

In that old and greatly overworked adage about the man who builds a better mousetrap, we are told that people will beat a path to his door. Statistics show that the mousetrap builder will be more likely to do a thriving business if his door can be reached by a good road.

The relationship between good highways and people has been the subject of a study by the State Highway Commissioner of New Jersey who has come up with some significant facts about population trends. He has found that from 1910 to 1920, the population of northern New Jersey increased more rapidly than that of southern New York, but that between 1930 and 1940, when New York had completed some 300 miles of parkways, the growth east of the Hudson was three times that of northern New Jersey.

This points to the conclusion that people tend to settle in regions where there are fast and safe traffic arteries, affording quick and easy access to business, recreational, and residential centers. In New Jersey, according to the Commissioner, the state's lack of adequate truck routes forces heavy express traffic to use city streets and the resultant blockage discourages travel by car to local stores and places of business. Travel tie-ups are cited as probably responsible for a 5 per cent aggregate population decrease from 1930 to 1940 in seven northern New Jer-

sey key cities.

The lesson in this for highway departments is clear. Our future highways must be planned and built to provide both swift safe movement for through traffic, and equally swift and easy access to urban and suburban areas, if those areas are to grow in population and prosperity.

No Tolls for N. Y. Route

New York State will not use tolls as a means of financing the state-wide Thruway which is to go into construction this spring. This decision was reached following a survey by three consulting engineers to determine if the traffic over the proposed route would be sufficient to underwrite the construction and maintenance costs, were an authority set up to undertake the estimated \$202,000,000 project.

By the laws of the State, an authority could be established to finance the entire construction, and to pay back the indebtedness later by charging tolls. This, however, applies to an entire project; only an amendment to the constitution can arrange for tolls on parts of the Thruway.

Work on the Thruway is to begin shortly at three or four points. Monies for the project will be appropriated from the State's general fund, on a pay-as-you-go basis.



William H. Quirk, the new Editor of
CONTRACTORS AND ENGINEERS
MONTHLY.

Wm. H. Quirk Named C&EMonthly Editor

William H. Quirk, who has been Eastern Field Editor of CONTRACTORS AND ENGINEERS MONTHLY since July, 1944, has been appointed Editor to succeed the late Theodore Reed Kendall. A graduate of New York University and an Associate Member, American Society of Civil Engineers, Mr. Quirk has had a varied background of practical construction experience, and since his association with our publication has traveled extensively throughout the territory east of the Mississippi, where he has become well known among contractors and highway department officials. His practical on-the-job reporting of the many construction projects visited has become a feature of C&EMonthly.

Mr. Quirk will continue to maintain close contact with the field in order to carry on CONTRACTORS AND ENGINEERS MONTHLY's policy of practical service to its readers.

Bay Bridge Congested

A new high in traffic on the San Francisco-Oakland Bay Bridge was reached January 20 when California state highway police estimated that almost 100,000 vehicles crossed the span between dawn and dusk. This exceeded by 20,000 the maximum daily estimate made when the span was constructed. Heavy congestion, coincident with the new record, produced 15 accidents between 6 and 7:15 p.m.

In This Issue

Aggregate Production.....	66
Bituminous Paving.....	1, 72, 90
Bridges.....	1, 42
Care of Equipment.....	23
Concrete Construction.....	1, 2, 6, 37, 42
Convention Reports.....	14, 21, 34
County Road Work.....	11, 63
Dike Construction.....	85
Editorials.....	4
Equipment Shops.....	77
Grading.....	2, 75, 90
Highway Maintenance.....	1, 37, 72
Legal Decisions.....	58, 59
News Photos.....	50, 51
Plans for Future Work.....	27, 41
Portraits in Print.....	7
Railroad Construction.....	42
River Control.....	85
Siphon Construction.....	6
Snow Removal and Ice Control.....	31
Tunnel Relining.....	1

"Opportunity Unlimited"

In Field for Veterans

The construction industry "offers a variety of opportunities to veterans anxious to start small manufacturing plants, go into distribution, work on construction projects, or prepare themselves for technical or professional fields", a 56-page pamphlet, "Opportunity Unlimited", points out. The booklet, designed to serve as a guide for veterans interested in the construction industry, is issued by the Committee on Opportunities for Veterans in the Construction Industry.

The booklet takes a bird's-eye view of the future before getting down to the problems of particular classes of returning G.I.'s. It outlines the changes that have occurred in the field and tells those returning to construction how conditions have varied from pre-war. Advice is given those seeking to enter the field either as workers, businessmen, or professional people. Tips are given on ways to convert wartime experience to construction needs.

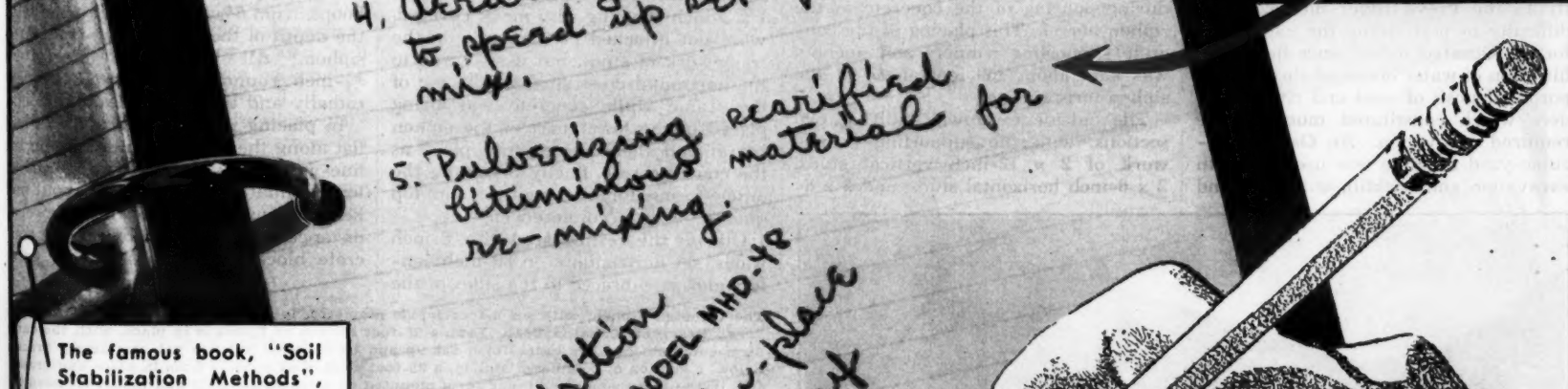
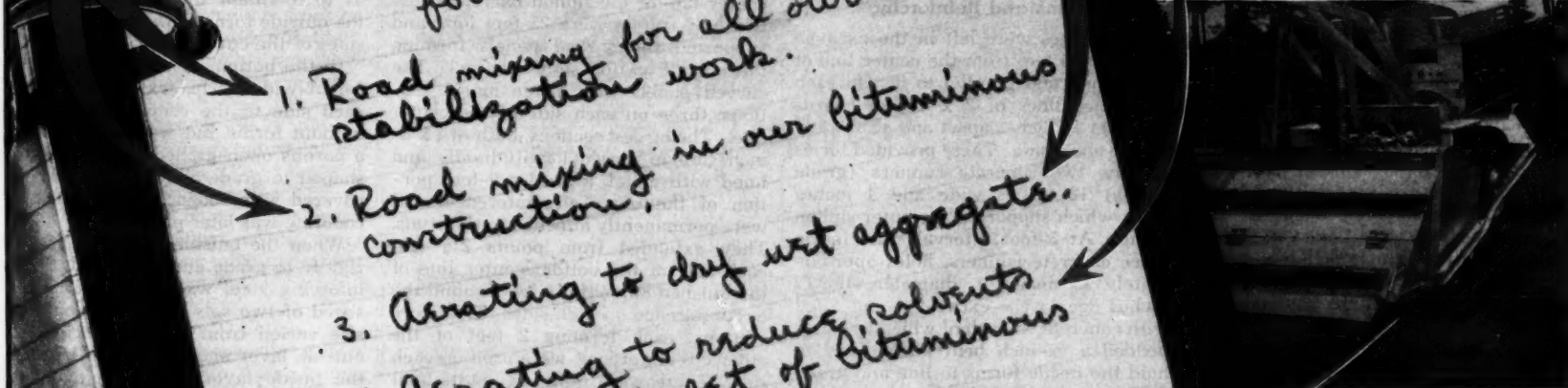
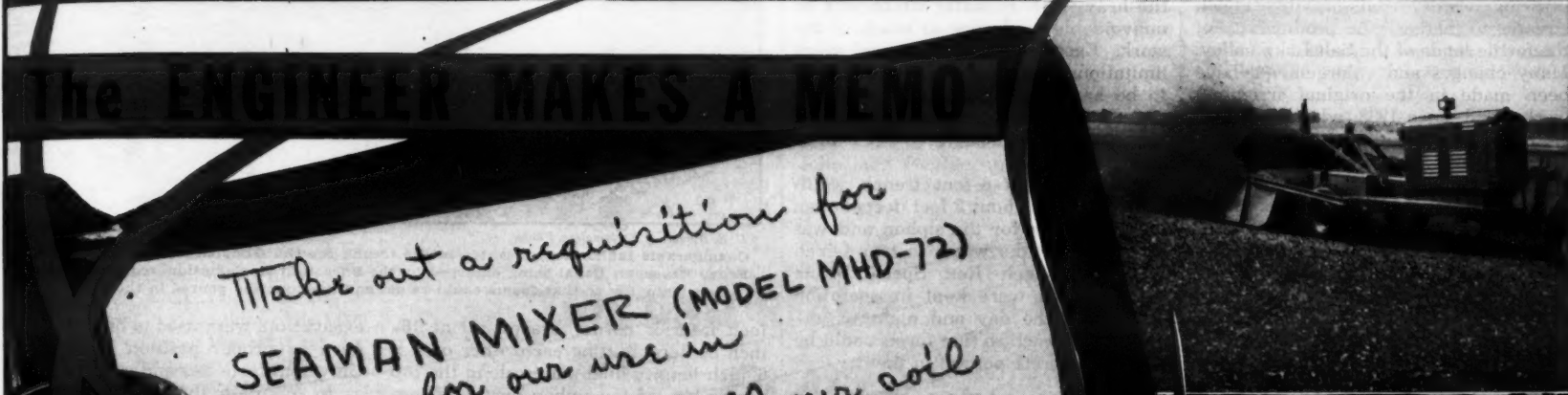
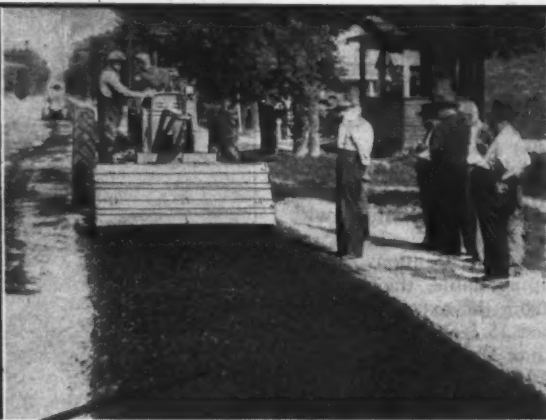
Stress is laid on the rights of the veteran under G.I. legislation. Schools and colleges for trade, technical, and professional training are discussed. Much reference matter is included. A special chapter is devoted to the potential employer of veterans. He is told the extent of G.I. training, the details of the apprentice-training problem, and given hints as to sources for skilled labor.

Copies of "Opportunity Unlimited" are available through the American Road Builders' Association, and other groups, or from E. Lawrence Chandler, Room 703, 1026 17th St., N.W., Washington 6, D. C., at 10 cents each.



Federal Works Agency Photo

Representatives of leading national organizations interested in highway safety met recently with Major General Philip B. Fleming, Federal Works Administrator, and Thomas H. MacDonald, Commissioner of Public Roads, to discuss agenda for the President's Highway Safety Conference to be held in Washington, May 8 to 10, inclusive. Front row, (left to right) Andrew J. Sordani, First Vice President, American Automobile Association; Brigadier General Edward H. Eastayo, Chief of the Highway Division, Office of Chief of Transportation, War Department; Thomas H. MacDonald, Commissioner of Public Roads; Major General Philip B. Fleming, Federal Works Administrator; and Malcolm McEachin, Secretary of State, Nevada, and President of the American Association of Motor Vehicle Administrators. Rear row, (left to right) Pyke Johnson, Automotive Safety Foundation; Chief of Police Fred Hoff, Morristown, N. J., President of the International Association of Chiefs of Police; Col. L. A. Yost, Transportation Corps, U. S. A.; Herman MacDonald, Massachusetts Director of Public Works and President of the American Association of State Highway Officials; and Ned Dearborn, National Safety Council.



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Construction Features Of 4,200-Foot Siphon

Form Work and Concrete Handling on Peripatetic Olmsted Siphon in Utah; Has Nine Crossings

By FRANK B. SARLES

† THE first Anglo-Saxon irrigation project in this country was undertaken by Mormon settlers in Utah in 1847, utilizing water from nearby canyon streams to increase the productivity of the fertile lands of the Salt Lake valley. Many changes and enlargements have been made in the original irrigation works, and since 1938, when the U. S. Bureau of Reclamation started its \$16,000,000 Provo River Project to provide supplemental water for 100,000 acres of fertile land, the advances and improvements have been steady.

One of the improvements currently under way is the enlargement of the Provo Reservoir Canal from its present capacity of 200 second-feet to a capacity of 550 second-feet to provide supplemental water to an additional 40,000 acres. A part of this enlargement was the construction of the 4,200-foot Olmsted siphon, with an 8-foot inside diameter. In its circuitous course, this siphon carries the canal under the Provo River twice, over it once, under two irrigation canals, under the tail-race of a power plant, under U. S. Highway 189 twice, and under a railroad. This interesting structure was built for the Bureau of Reclamation by J. B. and R. E. Walker, Inc., Salt Lake City, Utah, under a contract which includes a number of additional structures incidental to the enlargement of the canal.

Excavation and Backfill

Cramped working space and proximity to the Provo River increased the difficulty of performing the excavation for the Olmsted siphon since heavy infiltration of water occurred through the porous deposit of sand and river boulders which constituted much of the required excavation. An Osgood 1½-cubic-yard dragline was used for both excavation and backfill, with a second

dragline, a 1-cubic-yard P&H, handling excavation and concrete placing when the larger machine was occupied with backfilling.

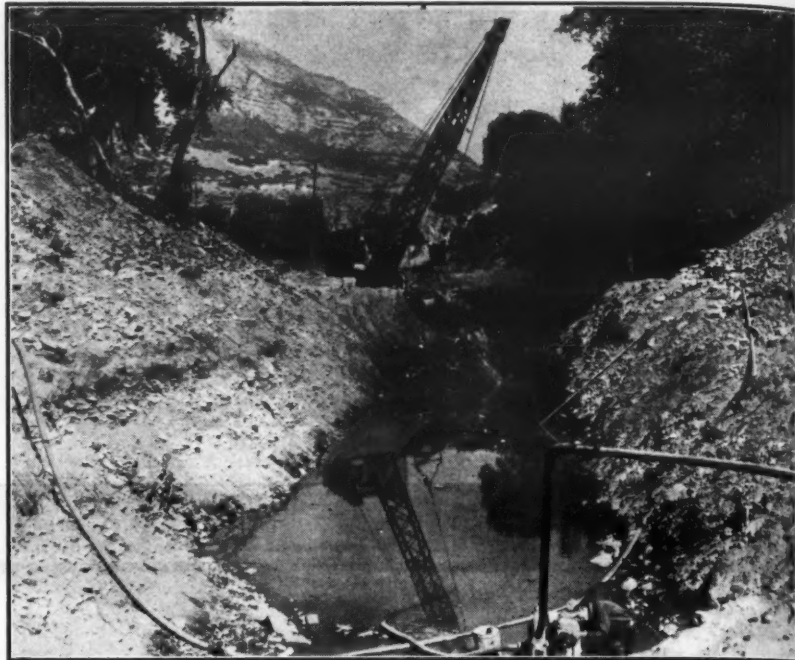
Except in certain locations where space was not available, the material was sidecast from the excavation. The trench averaged 15 feet in depth, with a bottom width of 12 feet in the few dry sections; an additional width of 6 feet was provided in the bottom to handle the heavy flow of water which was an unavoidable hindrance to much of the work. Except where, because of space limitations, the excavated material had to be hauled away and stockpiled for later backfill, the excavation averaged from 400 to 500 cubic yards per 8-hour day.

The additional 6-foot trench width was excavated about 2 feet deeper than the excavation for the siphon and was used to carry the water to two 4-inch and two 8-inch Rex Speed Prime pumps which were kept in operation throughout the day and night to unwater the trench so that forms could be set and concrete poured in the dry.

Forms and Reinforcing

Two ridges were left in the excavation, each 5 feet from the center line of the siphon and parallel to it. On each ridge two lines of 2 x 4-inch boards were set 12 inches apart and accurately to line and grade. These provided forms for the two concrete runners (grade plates) 12 inches wide and 4 inches thick which supported the outer siphon forms. At 5-foot intervals just inside these concrete runners, holes approximately 15 inches in diameter and 12 inches deep were excavated and filled with concrete, in each of which was embedded a ½-inch bent anchor rod to hold the inside forms to line and grade during pouring of the concrete in the siphon barrel. This placing of the concrete supporting runners and anchors was kept about 150 feet ahead of the siphon form setting.

The outside form was built in two sections, with the supporting framework of 2 x 12-inch vertical studs, 2 x 6-inch horizontal studs, and 2 x 8-



U. S. Bureau of Reclamation Photo

Considerable infiltration of water in the trench for the Olmsted siphon, a part of the Provo Reservoir Canal being enlarged by the Bureau of Reclamation, required constant pumping so that forms could be set and the concrete poured in the dry.

inch interior corner braces, all at 16-inch centers, butting each other on 2 x 6-inch longitudinal plates along the top center line of the siphon barrel. These two half-frames were 25 feet long and supported the curved panels forming the outside of the siphon barrel. The curved panels were made in six sections, three on each side of the center line. The largest sections, built of 1 x 6-inch shiplap placed longitudinally and lined with metal, formed a 6-foot portion of the outer circumference, and were permanently attached to the studs. They extended from points 2½ feet each side of the bottom center line of the finished barrel for 6 feet around the circumference on both sides. Two more sections, each forming 2 feet of the outer circumference, were used on each side. These were built of longitudinal 1 x 3-inch sheeting, also metal covered, were not attached permanently to the framework of studs, but were wired to the horizontal cross studs at the top of the frame while concrete was being placed in the lower part of the siphon barrel and then slipped into place as the concrete rose, finally becoming the outer forms for the next to the top quarter of its circumference.

Outside the vertical studs, 2 x 6-inch wales, set horizontally on 30-inch centers and pole-braced to the sides of the

excavation, were used to hold the inside form in proper position by means of Universal form ties and spacers, as well as to maintain the proper position of the outside form by the braces from the sides of the cut.

In the bottom of the siphon barrel a 5-foot-wide strip, extending equally each side of the center line, was left without forms, but was backfilled with a porous open-graded gravel, carefully shaped to grade and cross section, and covered with roofing felt on which the concrete was later placed.

When the outside form had been set rigidly to grade and alignment, the reinforcing steel was placed. This consisted of two sets of steel hoops whose size varied from ½ to ¾ inch in the outside layer and from ¾ to 1 inch on the inside layer. The spacing of the hoops, from 5½ to 8 inches, varied with the depth of the fill over the completed siphon. All longitudinal steel was ¾-inch round, spaced at 15 degrees radially and tied to the circular hoops.

In placing the steel, a 2 x 4 was laid flat along the bottom center line on the fine-graded invert and two pieces of longitudinal steel were set at about mid height along the sides, held the proper distance from the forms by precast concrete blocks and in position by wires.

(Continued on page 69)

The Olmsted siphon, with an 8-foot inside diameter, is part of a project to enlarge the Provo Reservoir Canal in Utah. Left, a 25-foot section of forms is in place, with the outer form complete and the inner form set up and bulkheaded but not yet completely braced. Below, a section of completed siphon, a 25-foot section of outside form in place and braced, and, in the foreground, the inner form mounted on a traveling dolly and pulled forward for cleaning and oiling, after which it was moved back inside the outer form.

U. S. Bureau of Reclamation Photos



Portraits in Print

By BILL QUIRK

Three Generations of Contractors Follow Growth of New England City

† NINETY-EIGHT years ago this summer an 18-year-old Irish immigrant boy landed in Boston, seeking a chance for survival in this brave new world of the West. The preceding year, 1847, was a dismal one in Irish history; the Emerald Isle suffered severely from a famine due to the failure of the potato crop, and a great Irish national leader, Daniel O'Connell, who had waged a continuous struggle along parliamentary lines for civic and religious freedom in his country, died amid the horrors of that famine.

The Irish youth on the shores of America also bore the name of Daniel O'Connell, but he had little time to think of the past and the demise of his illustrious namesake. Ninety miles west of Boston, near what is now the city of Holyoke, Mass., a great dam over 1,000 feet long, a colossal undertaking for the time, was being built on the Connecticut River, and strong young hands were needed as construction workers. Young Dan O'Connell did not linger long in Boston, but made his way westward to the bustling scene of construction activity, where he too helped in building the dam which was to make of Holyoke one of the busy industrial and commercial centers of New England. There he later founded the firm of Daniel O'Connell's Sons, Inc., General Contractor, which today is still going strong, headed by the third generation of a family that perpetuates the name of the founder.

The fortunes of the O'Connell contractors are in no small measure related to the growth of Holyoke, which in turn has been nurtured by the Connecticut River. Were it not for this ageless river whose tumbling waters turned mill wheels, Holyoke would not be standing today, and Daniel O'Connell I (the American builder, not the Irish parliamentarian) might have fathered a line of Boston policemen instead of having contributed heavily to the development of industry and transportation in his adopted country.

Water as Power

Countless legions who have never suspected it have had their lives shaped by Eli Whitney and his invention of the cotton gin in 1794. Two decades later, as a result of that invention, the factory system was introduced to America at Waltham, Mass., where a mill, modern for 1814, was built for the manufacture of cotton cloth. The success of this plant soon led to others, and since those were the days before the development of hydroelectric power, the mills were located along the streams where water power could be utilized directly. When more water power was needed, Boston capitalists turned to other river sites such as the farming village of Holyoke, with a population of about 3,000, yet having immense potential water power from the Connecticut River which falls 60 feet in a mile and a half just above the town.

After the dam to harness this water power was built, Holyoke began to grow. By 1873 the town had more than trebled its population and was chartered as a city, which later achieved beauty, distinction, and wealth. Holyoke owes its existence to the river and its tossing, power-laden rapids.

Young Dan O'Connell stayed on after the building of the dam, and with the exception of a few years spent in Springfield, 8 miles to the south, he

passed the rest of his life in Holyoke. He had been frugal with his earnings and accumulated enough capital to become a coal and wood dealer. His business prospered as the city grew and O'Connell, as so many Irishmen before and since him have done, took the inevitable flier into politics. He became Superintendent of Streets of Holyoke but soon discovered he was not cut out to be a politician. As his son, John J. O'Connell, now recalls with a chuckle:

Becomes Contractor

"Father was too outspoken for the

politicians. He did not like being told whom he should employ, or that he should put on a lot of help when he did not need them. Deciding that he preferred working for himself, he became a general contractor in 1879 when he was 49 years old. He started in on a small scale, excavating foundations for the factories which began mushrooming up around Holyoke."

Conditions were good for the contracting business during the last quarter of the nineteenth century in New England. Technological advances in cotton manufacturing with power-driven machinery stimulated the construction of new plants. Besides being a natural site for numerous factories and mills of the textile industry, Holyoke was to become one of the largest paper-manufacturing centers in the world.

Daniel O'Connell had married a Holyoke girl and raised a family of six boys, Daniel, Charles, William, Frank, John, and George, in that order, with John, now Treasurer of the company,



Daniel O'Connell, President, Daniel O'Connell's Sons, Inc., Holyoke, Mass.

the only son still surviving. The latter is soft-spoken and mild-mannered, with twinkling blue eyes beneath shaggy

(Continued on next page)

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Contractor Lineage Follows City Growth

(Continued from preceding page)

black eyebrows. His hair is grey, but his seventy-five years rest lightly on stout shoulders; he is a scant 6 feet and weighs 185 pounds. He handles a car skillfully and wears glasses only when reading. Every day finds him at the office, and his greatest enjoyment is scouting a prospective job, gathering data for the preparation of a bid.

The Early Days

"Dirt was excavated pretty cheaply in those early days," John O'Connell reminisced, "despite the use of hand labor and horse-drawn dump carts. We were paid 16 cents a yard for excavation and 15 cents a yard for backfilling, a price we can't approach today even with modern equipment. Of course the price of labor was way down. There were plenty of young, stout Irish boys around at that time who worked a steady 9-hour shift for only \$1.65 per day.

"The most important material of construction in that era was brick, as you might say concrete or steel is today. All the factories going up were of brick, so we decided to broaden our field and get some of this work. Two of us boys continued with the excavation end of the business, two others took up brick-laying, while George, the youngest, went to college and studied engineering. We did a lot of factory and mill construction, and ran our own brickyard to supply building material for those huge plants you see along the river and power canals of Holyoke. Even the tail-races were brick, and four other brickyards besides ours contributed to the industrial expansion of Holyoke. During that period the city could rightfully boast of the best collection of bricklayers anywhere in the country."

The building that now houses the O'Connell offices on Hampden Street is a monument to the bricklayers' art. Of red brick, the original 60 x 40-foot structure was erected in 1885 as a barn for the forty-odd horses on the early excavation and grading contracts. The building has since been enlarged to a 100-foot front on Hampden Street, and several rambling wings have been added to the rear at different times. The carriage stalls in back have long since been converted into garages, and the second-story haylofts are now used

for the storage of construction equipment. In the contractor's modern office, years ago a barn, five young ladies look after the business of the company and six engineers handle the technical end of the work. Two years ago the office narrowly escaped being a war casualty, with a near miss when two Army training planes collided high over Holyoke and crashed through the roof of the red brick house next door.

Forms Company

Daniel O'Connell I retired in 1900 when he reached 70, turning the business over to his six sons. He died at the advanced age of 86. In 1922, the contracting business was incorporated under the name Daniel O'Connell's Sons, Inc., with Daniel, the oldest son, as President; Charles, Secretary; and John, Treasurer. Daniel O'Connell II had a son, also Daniel, who is now President of the company. Charles O'Connell left a son, George, who is one of the company superintendents. The two younger O'Connells, Daniel III and

George, together with their uncle John, are maintaining the contracting reputation established by the two earlier generations of O'Connells.

While the days of new mill construction in Holyoke are hardly expected, since the textile industry has in more recent years migrated southwards towards cheaper labor, cheaper land, cheaper power and lower taxes, the existing mills and appurtenant works have furnished the O'Connells many a job with respect to their maintenance or improvement. The company has kept pace with the times and has been versatile enough to handle all types of heavy construction, including roads, dams, and bridges, as well as industrial buildings. It has also built two well known Holyoke edifices, the limestone World War I Memorial building, and the split-face-granite Holy Cross Church.

The company has a garage and equipment repair shop on a 6-acre site at Willimansett, 3 miles south of Holyoke, fronting on the road to Springfield and having a spur-track connection at the

rear with the Boston & Maine railroad.

Daniel O'Connell III

In 1932 the present President of the company, Daniel O'Connell III, went to work for the firm which his grandfather had established in 1879. He brought with him a sound engineering education acquired at the Massachusetts Institute of Technology from which he had graduated in 1929 with a civil engineering degree, and three years of intensive construction experience in the East and in California. He is a tall, friendly, athletic-looking man with sandy hair and a tiny brown mustache, and was born on St. Patrick's Day 38 years ago. His main interests are his family, wife and three children, and the company, with his golf game a far-distant third in importance. The children, all boys, are a fourth Daniel J., aged 7, Franklin M., 4, and James J., six months old.

"Our work has centered chiefly around this part of New England,"

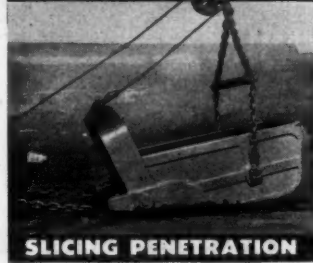
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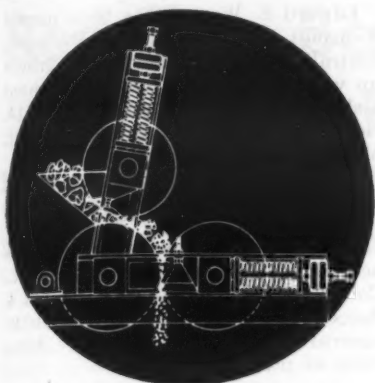
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New Crusher Design Employs Triple Rolls

A new design of roll crusher, utilizing three rolls, has been announced by the Pioneer Engineering Works. This triple roll crusher, said to do the work of two crushers, employs rolls equipped with manganese steel shells, the extra roll being mounted above the stationary roll. The rock to be crushed is fed into the opening between these two rolls before passing between the stationary and the horizontal floating roll. One such set-up has been in successful use for three years, Pioneer reports.

Those who already possess Pioneer roll crushers may procure the third roll assembly from the factory, complete with all attachments. The triple roll crusher is at present available in two sizes, 54 x 24 inches, and 40 x 22 inches.

Further details may be secured by writing to the Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn. Say you saw it in CONTRACTORS AND ENGINEERS MONTHLY.

H. C. Maurer Dies at 53

A well known figure in the clay products industry, H. C. Maurer, President of National Clay Pipe Manufacturers, Inc., and of the Clay Sewer Pipe Association, died January 16 at his home in Columbus, Ohio. He was 53. In the course of his career, Mr. Maurer was head of the Sewer Pipe Manufacturers of Urichsville, Ohio, and an executive of the Universal Sewer Pipe Co., the American Vitrified Products Co., the Dunlop Rubber Co., and the McGraw Motor Co.

ELLICOTT DREDGES

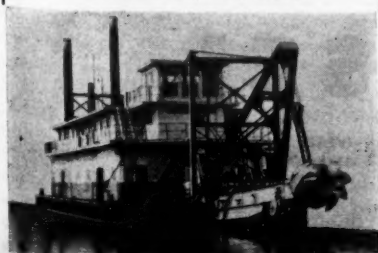
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Contractor Lineage Follows City Growth

(Continued from preceding page)

O'Connell remarked, "and we have found enough here to keep us busy. One of our largest jobs was right here in town, a \$1,000,000 contract, building those great concrete river walls along the banks of the Connecticut in 1937. We shall be bidding for some more of this type of work soon, I believe, as the Federal government expects to construct extensions to these walls for additional protection against floods in the valley."

When the war halted the company's usual activity in the highway field, its efforts were directed towards military construction at Camps Edwards and Devens, Mass., and at Rye Beach on the New Hampshire sea coast. The latter work was a top-drawer military secret; a heavy construction job requiring 60,000 cubic yards of concrete and 5,000,000 pounds of reinforcing steel,

which was completed in record time.

Post-war construction is keeping the 250 employees of the old contracting firm busily occupied. Last summer the company resurfaced the face of a concrete dam for the Western Massachusetts Electric Co. at Shelburne Falls on the Deerfield River, adding a 4-foot layer of concrete to the 340-foot-long x 20-foot-high structure. Another project was grading and seeding a 25-acre site for an addition to St. John's cemetery at Worcester. The O'Connells also got back into highway work with the building of a new concrete and steel bridge over the Westfield River between Agawam and West Springfield. The resources of the company to take on many jobs, both small and large, are limited only by the amount of labor available during the coming construction season.

As in the past, the O'Connell company is strongly linked to Holyoke industry and the Connecticut River. The three major power canals, which flow from above the dam through the city

at different levels before joining the river again, are now having their concrete side walls repaired by O'Connell employees. The company is also engaged in physical alterations to plants and mills as reconversion from war to peacetime industry entails extensive rebuilding. Nearly a century ago the first of the Daniel O'Connells got in on the ground floor when he helped build the dam which started the growth of Holyoke. The third generation is maintaining the construction standards established in those pioneer days of American contractors.

New Le Roi Service Mgr.

The appointment of Ralph N. Weber as Service Manager in charge of the service repair shop and the field service program has been announced by Le Roi Co., Milwaukee, Wis., manufacturer of industrial gasoline engines and air compressors. Ten years with the firm, Mr. Weber has been Manager of the Service Order Department.

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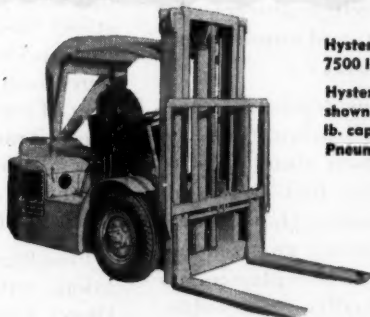
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Booklet Stresses Role Of Rotary Snow Plows

"Only a rotary can dig out a lost highway, or reclaim a snowbound city", the Wm. Bros Boiler & Mfg. Co. claims in a recently issued 8-page brochure on the Sno-Flyer rotary snow plow.

The importance of rapid snow clearance in relation to our modern economy is stressed in the booklet. It points out that while it costs a great deal of money to maintain fleets of snow-fighting equipment, "the cost of a single storm may be so great that the comparison is a puny one". Big rotaries are essential

units in snow-fleet requirements, the booklet says, maintaining that a balanced fleet should have one for every ten V and one-way plows.

Photographs are used extensively throughout the folder to show Bros rotary plows in action. Diagrams and close-ups illustrate the varied features of the plows. Specifications of the rotary unit, with and without the loading chute attachment for use with trucks, and of the power unit, and general data on the Sno-Flyer complete the booklet.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may obtain this brochure, Form RE-1, from the Wm. Bros

Boiler & Mfg. Co., 1057 Tenth Ave. S.E., Minneapolis 14, Minn. Mention this item.

Named to Lima Posts

The appointment of Paul Fenwick as District Manager for California, Arizona, and Nevada has been announced by the Shovel & Crane Division of the Lima Locomotive Works, Inc., Lima, Ohio. Associated with the shovel and crane industry in manufacturing, design, and sales before the war, Mr. Fenwick served for over four years with the Army Transportation Corps.

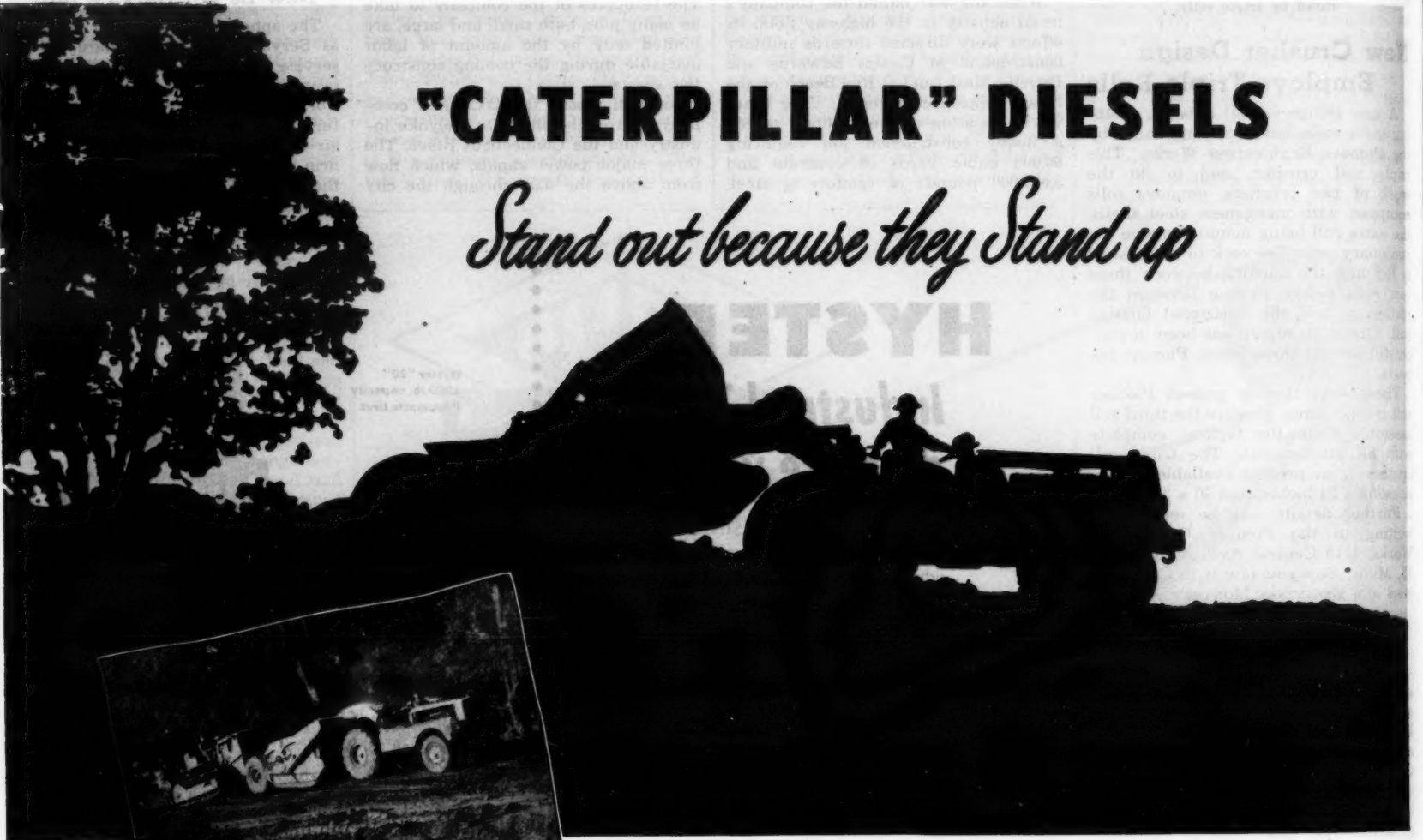
Edward E. Worrell has been named Assistant Manager for the Division's central district. Mr. Worrell has grown up with the industry, having operated a shovel for his contractor father at 14. He was in the contracting business with his father in Ohio and Pennsylvania.

Ohio Consulting Firm

A consulting engineering practice has been established at 630 East Broad St., Columbus, Ohio, by Alden E. Stilson & Associates. The firm will engage in general civil engineering practice, handling all phases of such work.

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saving to his customers and at an attractive profit to himself.

What is a typical tough job? Levee building, for one. Working in heavy, sticky Mississippi River gumbo in particular. On the project spot-illustrated here, Luhr Bros. Construction used a fleet of scraper-operating "Caterpillar" Diesel Tractors of both track and wheel types. "Zoning" the equipment to fit the hauls and other needs speeded the work, cut cost, made more money.

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Red-Dog Base Course Used on County Road

Mine Waste-Product Mixed With Sand; Other Local Materials Include Slag From Steel Mills

A 10-MILE stretch of road was recently reconstructed with all local material, including the tar used in the seal coat, in Jefferson County, Ala. Beginning at Flat Top, 20 miles northwest of Birmingham, the road winds through the heart of the industrial coal and steel district which furnishes such road-building material as red dog, sand, sand-rock, and also slag from the nearby steel mills. Red dog is the popular name for culm, a refuse composed of burnt shale and coal which results from spontaneous combustion in the waste piles at soft-coal mines.

The Georgia-Alabama Construction Co. of Birmingham had the contract for constructing a 24-foot base course of red dog and soft sand-rock 4 inches deep, on top of which was laid a mixture of crusher-run slag and sand, 22 feet wide and 4 inches deep, which was given a 20-foot double bituminous surface treatment.

The existing county road begins at Graysville on U. S. 78 and goes westward as a black-top surface 4 miles to a bridge over the Locust fork of the Little Warrior River. This project began near the east end of this bridge at the coal-mining town of Flat Top, and ended at Praco, where the largest coal mine in Alabama is located. From Praco a 1-mile spur runs north to Wegra, another coal-mining town, located on the Walker County line. The original road was built many years ago to give access to these coal mines, and in 1938-1941 it was widened by the WPA from 20 to 26 feet and given a surface of red dog. World War II raised the problem of providing a better road to serve these important mines as the existing road was failing under heavy wartime traffic.

Base Course

The new base course on the western half of the project is a mixture of red dog and sand, while on the eastern half it is a mixture of red dog and soft sand-rock. The difference in the choice of material to mix with the red dog was determined by the proximity of the sand and sand-rock at either end of the job.

Red dog for the western half of the road came from the stockpiles of the mine at Wegra, located near the end of the Wegra spur, and for the eastern end, from the mine at Flat Top, a mile from the end of the job. The red dog is free for the taking, so the contractor put a Lorain ¾-yard shovel at each of the two locations to load the inexhaustible supply from the waste piles. A fleet of twenty-four Ford 1½-ton dump trucks, carrying 5 yards each, was used to haul the material a maximum distance of 6 miles to the point on the road farthest from the source of supply. Half of these trucks were owned by the contractor, while the rest were rented from J. E. Bryant, a hauling contractor from Montgomery, Ala., on a yard-mile basis.

The red dog was end-dumped down the center of the road, 30 yards or six truckloads to the station, forming a windrow roughly 3 to 4 feet high and 5 to 6 feet wide. Two Caterpillar power graders, a No. 10 and a No. 12, promptly spread the material over the road. A grader with its blade angled at 45 degrees straddled the windrow, taking about half the material, and pushed it over half the road, after which it turned around and spread the rest of the wind-

row over the other half of the road, making a 5-inch loose layer of red dog 22 feet wide.

To the red dog on the western half of the road was added sand taken from a pit alongside the Warrior River, 1 mile south of the road and 1¼ miles east of Praco. The soft sand-rock used on the eastern half of the job has a low clay content, and is easily pulverized in the hand. This material came from two pits, one located on the right-of-way about 2 miles from the eastern end, and the other 1½ miles west of Flat Top and 1/3 mile north of the road. This material was excavated by the shovels and dumped in a windrow down the center of the road, 4 feet wide and 1 foot high, 15 yards to the station. The graders spread the sand or sand-



C. & E. M. Photo

A Lorain ¾-yard shovel loaded red dog from stockpiles at a mine to trucks for hauling to a county road where it was used for the base course.

rock over the red dog in a mat 22 feet wide and 1 inch loose depth. A Caterpillar D7 tractor then pulled a Rome disk harrow with two rows of 28-inch

disks, ten in front which threw the material out and ten in the back row which threw the material in, from ten
(Continued on next page)

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East of
Mississippi River

Red-Dog Base Course Used on County Road

(Continued from preceding page)

to twelve times longitudinally over the material, thoroughly pulverizing it.

The graders then moved in and shaped the mixture of red dog and sand into a windrow, at the center of the road, which had about the same dimensions as the original red-dog windrow. Over this pile the tractor pulled the harrow to grind the mix still finer. After this operation the graders split the center windrow and pushed the material across the road to form smaller windrows on each side. Then these windrows were moved back to the center again into one windrow and the same process repeated. During these movements, the tractor and harrow followed close behind the graders, assisting in the pulverizing and mixing.

The mixture was kept at optimum moisture content by spraying from two 1,000-gallon water tanks with 7-foot spray bars, mounted on Ford trucks. Four Gorman-Rupp 2-inch pumps were spotted along the road at creeks to pump water to the tank trucks. The windrows were moved back and forth across the road until the materials were well mixed; this took from 8 to 9 hours for a ¼-mile stretch of base course. To test the thoroughness of the mixing, trenches were dug at 500-foot intervals through the base when it was spread out across the road, and if the materials were considered mixed sufficiently the red-dog-sand base was shaped to the typical 24-foot-wide cross section.

If necessary, the base was moistened again, and then rolled by a LaPlant-Choate dual-drum sheepfoot roller pulled by a Caterpillar D7 tractor until 100 per cent compaction was indicated by the Proctor tests. Final rolling was done by a Bros rubber-tire roller pulled by an International rubber-tired tractor. Traffic was maintained over the road during all these operations as the movement of the cars assisted in the mixing, pulverizing, and compacting of the materials.

Top Course

The top course was made up of slag, 28 yards to the station, laid in the same manner as was the red dog. The slag was crusher-run, graded from 1½-inch down to screenings, and was shipped by rail from the Birmingham steel mills 25 miles to the L & N siding at Colta, where it was unloaded by a belt conveyor into trucks which hauled it an average of 5 miles to the road. The slag was mixed with sand or sand-rock, 15 yards to the station, by the graders, which operated the same way as they did on the base course. Harrowing was not necessary as the sand-rock was pulverized sufficiently by the graders and rollers. This top course was also compacted to a 4-inch depth for a width of 22 feet, and was shaped to a crown of ¼-inch to the foot. A 2-foot shoulder of unstabilized red dog was built up at



C. & E. M. Photo

Red dog for road base was dumped in a windrow and then spread across half the road at a time by a Caterpillar grader.

each side, and the side slopes have a maximum grade of 1½ to 1.

The bituminous work was sublet to R. B. Tyler, a Louisville, Ky., contractor, who applied a 22-foot prime coat of RT-3 tar at the rate of 0.27 gallon to

the square yard. This was followed by a standard double surface treatment of 0.42 gallon of RT-12 tar to the square yard, and covered by 0.5 cubic foot of slag to the square yard, graded from 1¼-inch down to No. 4 size, for the

mat. For the seal, 0.35 gallon of RT-12 tar per square yard, covered with 0.27 cubic foot of slag from ½-inch to No. 10 size, was used.

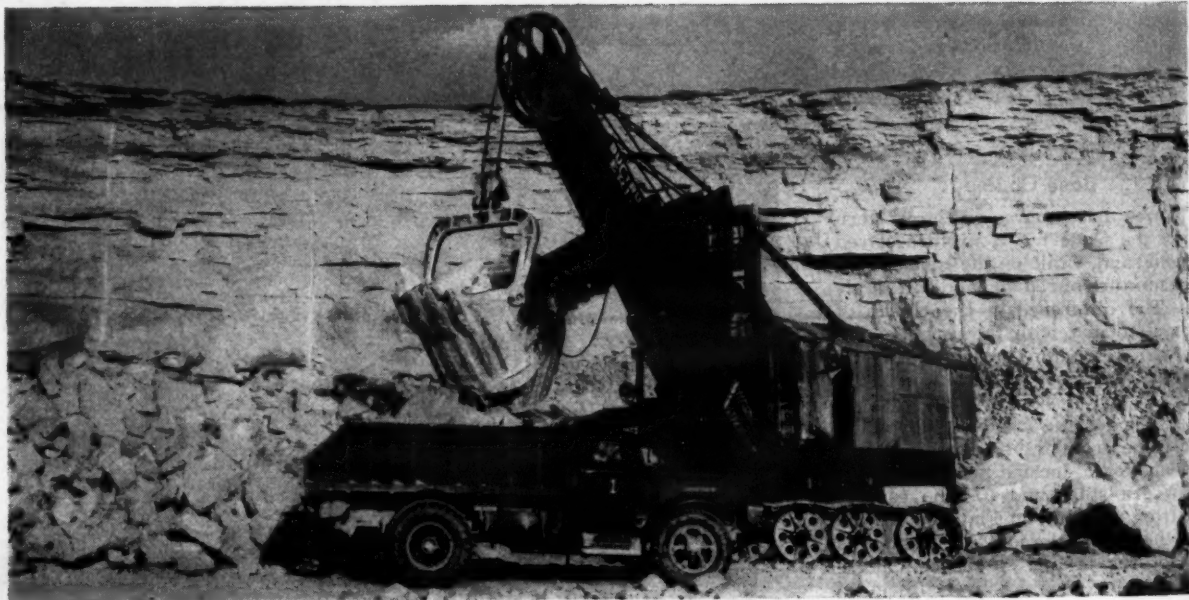
Quantities and Personnel

Work on this road-stabilization project started March 15 with the replacement of unsuitable subgrade soil, which was encountered in some places, with a 6-inch compacted layer of topping material consisting of a mixture of red dog and soft sand-rock. A force of 26 was employed, consisting of 2 shovel operators, 2 tractor operators, 2 grader operators, 2 oilers, 12 truck drivers, and 6 laborers who laid pipe, dumped the trucks, and served as flagmen. Ten 12-hour days were required to lay a mile of completed two-layer base course. Not more than a mile of road was worked on at a time in order to minimize delays to traffic. The job was completed early in August.

The major items in this reconstruction were as follows:

(Concluded on next page, Col. 3)

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This new Model 4-U spreader is a recent addition to the Good Roads line of road equipment.

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The new Model 4-U Good Roads spinner-type tractor-powered spreader will distribute a layer of sand, cinders, salt, or calcium chloride over icy pavements 25 feet wide at 10 miles per hour. This same spreader works equally well forwards or backwards so that it may be used for spreading sand or chips for a bituminous surface treatment. A special hitch for the Model 4-U swings in an arc and is instantly adjustable to any desired position while the truck attachment remains fixed.

This new unit gives a free and uninterrupted spread of 270 degrees with no braces or supports to interfere, and its improved hinged deflector plates give greater control over the spread, it is stated.

For complete information and prices, write direct to Good Roads Machinery Corp., Kennett Square, Pa., mentioning this illustrated news item.

Wailes Dove-Hermiston Taken Over by Koppers

The acquisition of the entire common stock of the Wailes Dove-Hermiston Corp., Westfield, N. J., by the Koppers Co., Inc. of Pittsburgh, has been announced by J. N. Forker, Koppers Vice President, and Linden Stuart, President of the New Jersey firm. Wailes Dove-Hermiston manufactures bituminous coatings for protecting steel and iron from corrosion. Its first product, Bitumastic Enamel, was brought out in 1854, and many other products have been developed by the firm since.

The New Jersey company will continue to operate as a separate organization under the same management that has led its activities for many years, Koppers has announced.

Cox and Woodbury Cease 40-Year du Pont Tenure

Completing terms which have extended over 40 years, two divisional heads of the du Pont Explosives Department retired from the firm January 1. They are C. A. Woodbury, Manager of the Technical Division, and I. J. Cox, Manager of the American Glycerin Section and Production Manager of the Black Powder Section.

Mr. Woodbury has been succeeded by Dr. B. H. Mackey, who has been on special assignment with the Government at Hanford, Wash., for the past two years. G. H. Loving, an Assistant Director of Sales in the Explosives Department, has been appointed head of the American Glycerin Section, while Mr. Cox's duties in the Black Powder Section are now being carried out by H. K. Babbitt, Production Manager of the Special Products Section.

Versatile Power Hammers

Electric hammers having a wide range of applications are featured in a 4-page folder, Bulletin 1043, available from the Syntro Co., 227 Lexington Ave., Homer City, Pa. Many uses of the hammer are shown in actual action photographs, its four models are illustrated, and an extensive line of accessories, including drills, chisels, etc., are shown. Copies may be secured direct from the company on mention of this notice.

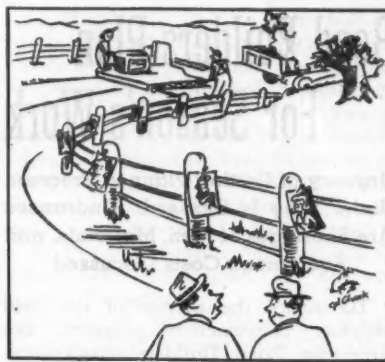
Red-Dog Base Course Used on County Road

(Continued from preceding page)

Earth work	5,600 cu. yds.
Roadbed topping material	3,750 cu. yds.
Red dog for shoulders	12,000 cu. yds.
Red dog for base course	17,500 cu. yds.
Sand and soft sand-rock for base course	17,000 cu. yds.
Crusher-run slag for base course	15,200 cu. yds.
Double bituminous surface treatment	123,000 sq. yds.
Concrete pipe, 15 to 30-inch	400 lin. ft.

Of the total \$124,214 cost of the project, the State of Alabama paid \$50,000 as part of its State-Aid program to help counties build roads which are badly needed. Jefferson County paid the \$74,214 difference, and supplied the plans and the necessary engineering inspection, while the State Highway Department supervised the work to see that it was constructed according to state standards and specifications. The set-up is similar to that used with Federal-Aid-to-state road construction.

C. J. Rogers is Highway Engineer for Jefferson County; and C. H. Wyatt was Resident Engineer for the County on this project. C. M. Pierson is President



"Some vets are back, I see."

of the County Commission, with Earl Bruner and Henry W. Sweet, Associate Members. T. F. Hobart, Assistant Division Construction Engineer in the Second Division of the Alabama State Highway Department, was in charge of the state end of the work. Jerry Gwin, Jr., was Superintendent for the Georgia-Alabama Construction Co. of Birmingham.

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Road Builders Plan For Season's Work

Urgency of Getting Planned Program Under Way Is Stressed; Hindrances Are Shortages of Men, Materials, and Equipment; Costs Discussed

TO insure the success of the 1946 highway construction program, the American Road Builders' Association discussed seriously and at length the necessary steps in this direction at its 43rd Annual Meeting at the Stevens Hotel in Chicago from January 14 to 17. A total of 1,244 delegates registered for the four-day session, including Federal, state, county, and municipal highway officials and engineers, contractors, equipment manufacturers and distributors, material producers, and others interested in highways.

Despite the availability of sufficient money for a large program, which Federal-Aid and matching funds from the states and subdivisions have made possible, concern was expressed that the first-year plan of constructing \$1,000,000,000 worth of highways would fall short of that goal. Keynoters at the various sessions stressed the need for cooperation from all concerned to make a strong start this year on the \$3,000,000,000 three-year program to justify the \$1,500,000,000 Federal-Aid appropriation. If Congress feels that this program for more, better, and safer highways, which will also play such a large part in furnishing jobs to millions throughout the country, is not vigorously pushed, the legislators may not be willing to go along with future grants, several speakers declared.

The general consensus was that the program would not get into full swing until midsummer, while estimates varied from \$300,000,000 to \$750,000,000 as the amount that could be spent this year on road building. The chief factor retarding the development of the 1946 program is the time element, inasmuch as the period between the end of the war and the beginning of the construction season has been too brief for the total elimination of bottlenecks which, however, are gradually being lessened.

Engineer Shortage

Foremost on this list of bottlenecks,

according to Charles M. Upham, Engineer-Director of the ARBA, speaking at the opening session, is the shortage of highway engineers to prepare plans and to direct the construction of roads and bridges. In analyzing this problem, Mr. Upham stated that of the 20,000 engineers who left highway departments during the war period only about half are expected back. Some of those not returning are war casualties, but the greater number have found better-paying positions in fields other than highway construction, and can be induced to return only with the offer of higher salaries.

Another solution to attract needed men was the suggestion to highway departments to give three months' pay-while-learning courses to former service men from the Army Engineers or Navy Seabees for adequate training to fill certain positions in road building. These ex-G.I.'s are considered excellent material for such occupations, as their wartime jobs have given them a good groundwork in construction practices.

Only in this way can engineering staffs be increased to take care of a potential highway program that will be three or four times as large as any previously undertaken in this country.

The Cost Problem

Mr. Upham also urged that contractors' bids for highway work be considered on the basis of index prices for the years 1925-1929, the last "normal" period before the depression and war caused such abnormal fluctuations in our economy. Taking index prices in 1927 as 100, this figure dropped to 61 during the depression, and had risen to only 81 by 1941, at which time the effects of the depression were still strongly felt. Using the 1925-1929 period as a yardstick for estimates, highway departments are justified in accepting bids that may be 35 per cent above 1941 prices, said the ARBA spokesman.

Other factors tending to slow the program are the still existing shortages in skilled labor, equipment, and materials, with a definite trend towards

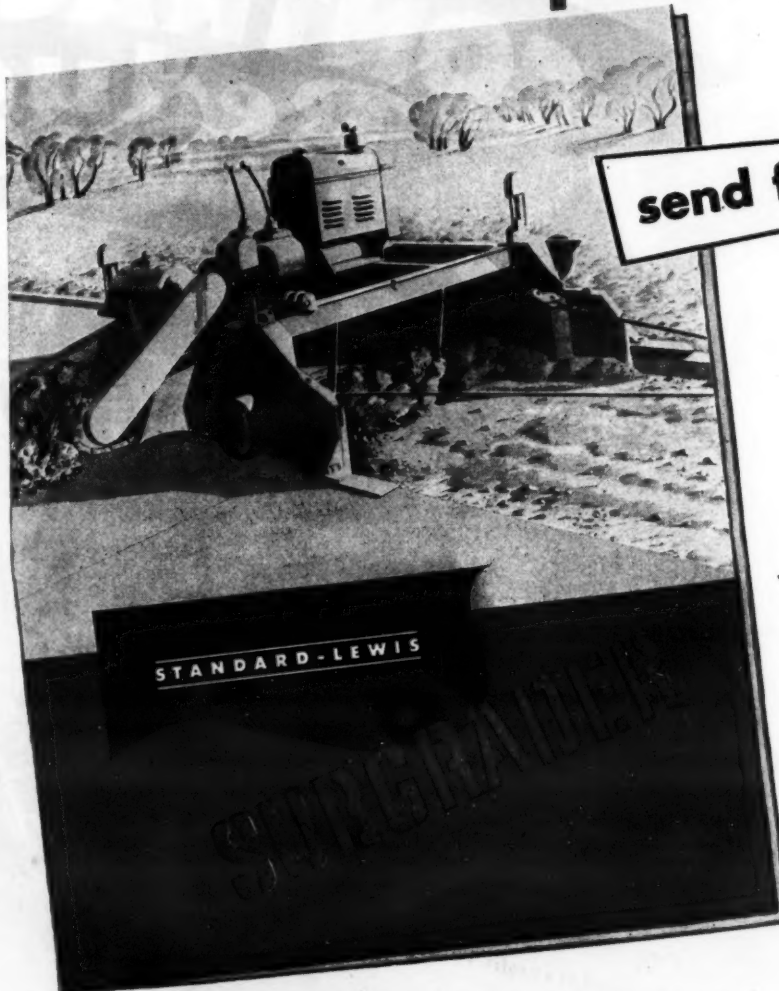
higher costs for all three items. Plans to hold the price line were made at the opening session by Major General Philip B. Fleming, Administrator, Federal Works Agency at Washington, and the Hon. Jesse P. Wolcott, Member, Committee on Roads, U. S. House of Representatives.

"The Government should not be a party to a rising level of prices," said General Fleming, "that will choke off needed public construction, or lead directly to inflation. In the long run, the contractor himself will be better off if the price level is held. If we allow prices to rise 20 per cent, say, and let contracts at that level, it will simply mean that we will get 20 per cent less highways for our money, and the contractor will get a lesser volume of work. And that fact should be an important bargaining point between the contractor and the people who supply his equipment and materials."

A similar plea was also voiced by Congressman Wolcott who stated that

(Concluded on next page)

For Complete Facts



send for this folder

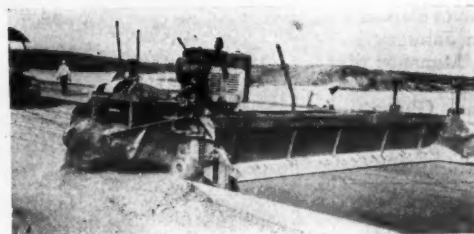
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ARBA officers for 1946 are, left to right, Nathan L. Smith, President, Municipal Division; Paul B. Rynning, President, County Highway Officials' Division; James Skelly, President, ARBA; and Charles W. Smith, President, Contractors' Division.

Road Builders Plan For Season's Work

(Continued from preceding page)

the Government has an obligation to stabilize currency and labor so that "contractors won't lose their shirts in bidding on jobs". A strong American economy must be maintained to avoid further depreciation of the dollar, the Congressman concluded.

Plea for Safety

Another Congressman, Hon. J. W. Robinson, Chairman, Committee on Roads, House of Representatives, spoke earnestly on the increasing number of traffic fatalities since the end of the war, and urged the road builders to pay more attention to safety precautions as part of the highway-building program, while grade-crossing eliminations should go ahead at a pace demanded by costly delays and traffic dangers.

Technical Sessions

General sessions on the second and third days of the meeting were given over to technical discussions on the design, construction, and maintenance of highways and airports. Particular emphasis was laid on subgrades, stabilized roads, and soil compaction in the highway field, while all phases of airports were examined at the particular session on that subject. Twenty papers by well known specialists in their fields were read at these meetings.

The delegates also met the new head of the Public Relations Division, Professor Roscoe Ellard, of the Graduate School of Journalism at Columbia University, New York, who is also connected with the Eno Foundation for Highway Traffic Control.

At the Pan-American luncheon on the second day, Engineer-Director Upham reported that twenty engineers from Latin American countries will arrive in the U. S. in April to spend a year learning our methods of highway construction under the sponsorship of the ARBA. Following a four-week indoctrination period they will tour manufacturing plants and visit highway departments and road projects throughout the country. Señor Francisco Rodriguez Cabo, Chief of Maintenance, Department of Communication, Mexico, speaking at the luncheon, pointed out that these trainees would not necessarily adopt the methods used in this country, but would adapt them to their

own particular problems.

Pan American Award

At the annual banquet of the ARBA, the Hon. Paul Cunningham, U. S. Representative from Iowa, Member, House Roads Committee, presented the Pan American Award for Outstanding Achievement in the Development of

the Pan American Highway. Two plaques were presented, one to the North American recipient, Thomas H. MacDonald, Commissioner, Public Roads Administration, and the other to the Latin American recipient, Montes de Oca, President of the Automobile Club of Mexico. He is former Minister of Finance, President of the Bank Internationale de Mexico, and a former president of ARBA's Pan-American Division. In the absence of Señor de Oca, the award was entrusted to Gilberto del Arenal, Director General of Highways, Mexico.

Congressman Jennings Randolph, Member, Committee on Expenditures in the Government Departments, House of Representatives, was the banquet speaker.

New Officers for 1946

James J. Skelly, Media, Pa., was re-elected President of the American Road Builders' Association for 1946; he is President of the contracting firm of James J. Skelly Co. Paul B. Rein-

hold, Pittsburgh, Pa., succeeds himself as Vice President of the Northeastern District. Alex F. Hancock, Mobile, Ala., becomes Vice President of the Southern District, succeeding W. A. Young, Macon, Ga. E. R. Galvin, Massillon, Ohio, was reelected Vice President of the Central District. Robert A. Allen, Carson City, Nev., becomes Vice President of the Western District, replacing C. H. Purcell, Sacramento, Calif. H. C. Whitehurst, Washington, D. C., was elected Treasurer.

Charles W. Smith, President, Smith Engineering & Construction Co., Pensacola, Fla., was again elected President of the Contractors' Division, with L. W. Edison, Grand Rapids, Mich., as Vice President. The new President of the County Highway Officials' Division is Paul B. Rynning, County Engineer of Jackson County, Oreg., succeeding Arthur F. Ranney of Akron, Ohio.

J. T. Callaway, Assistant to Vice President, Goodyear Tire & Rubber Co., was again elected President of the Manufacturers' Division of the ARBA.

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1. Model T7 TRAXCAVATOR excavating for a new plant in California
2. Model T2 cleaning a landslide from a highway

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Calcium Chloride Use**In Concrete Mixtures**

The use of calcium chloride to accelerate the hardening of portland-cement concrete is discussed at length in a 64-page booklet available free from the Calcium Chloride Association. Considering first the advantages of the chemical in concrete mixes, the pamphlet gives directions for its use.

A large section of the work is devoted to practical experiences with calcium

chloride in concrete construction. Technical abstracts and references are also presented, and many photographs and charts appear throughout the booklet to illustrate all phases of calcium chloride use in concrete.

Readers of *CONTRACTORS AND ENGINEERS MONTHLY* may obtain copies of the booklet, "Calcium Chloride in Concrete", by writing the Calcium Chloride Association, 4145 Penobscot Building, Detroit 26, Mich. Mention this notice, and ask for Bulletin 28.

Iowa AGC Meeting

A change in name, from the Central Branch of the Associated General Contractors of America to the Associated General Contractors of Iowa, was effected at the recent 24th Annual Meeting of the group. The older name was a throwback to the days when the body's jurisdiction extended beyond Iowa's borders.

R. W. Welden, Iowa Falls bridge contractor, was named President of the

Board of Directors, succeeding F. H. Carlson. Rudolph W. Weitz, Des Moines, and T. L. Sears, Clear Lake, are Vice Presidents, and George C. Koss, Des Moines, Treasurer.

Divisional Directors elected include Arthur D. Ladehoff, Clinton, bridges; O. F. Paulson, Cedar Rapids, building; W. G. Scothorn, Cherokee, grading; Herman L. Sani, Des Moines, paving and surfacing; Irving F. Jensen, Sioux City, and Harry Hoak, sewer, water works, and electrical.

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More than 500 Athey Mobiloaders on tough loading jobs today are proving Athey Mobiloader performance and dependability. Now comes the greatly improved Model W4-5—a product resulting from intensive engineering research and two years of grueling field tests.

With many outstanding improvements in design the new Athey W4-5 Mobiloader, which is powered by the "Caterpillar" Diesel D4 Tractor, offers better visibility, hydraulic "finger-tip" control, greater stability, increased production, and other refinements.

To contractors, highway officials, miners, quarry operators, street departments, seeking low-cost, dependable loading, the Athey W4-5 Mobiloader is the money-saving answer. Its "straight-line" operation cuts loading time; boosts production and saves wear on the tractor. Get more facts on the new Athey W4-5 Mobiloader from your Athey "Caterpillar" Dealer, or write direct to

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Athey

Tunnel and Canals Restored by Relining

(Continued from page 1)

\$585,000, contained these principal surfacing items:

Item	Quantity	Price
Gunite lining in canal sides	426,000 sq. ft.	\$0.25
Concrete in canal bottom	250,000 sq. ft.	0.34
Gunite in tunnel sides	368,000 sq. ft.	0.46
Gunite in tunnel floors	202,000 sq. ft.	0.50

Canal-side lining is 1½ inches thick; canal-bottom concrete, 3 inches; tunnel-side Gunite, ½ inch; and tunnel-bottom Gunite, 1 inch in thickness.

The contract price for tunnel Gunite included painting with two coats of coal-tar paint, applied by spray. In addition to the above items, steel penstock tubes so laboriously hauled in by mules a quarter century ago were flame-cleaned and brushed inside and repainted with CA50 coal-tar paint, applied cold. This work was done under a subcontract with the Walter Ferem Co. of Los Angeles. Five thousand linear feet of Lennon-type steel flumes in nine sections, the longest of which was 1,830 feet, were cleaned and repainted with hot asphaltic paint applied at 400 degrees F with cotton mops. Arco concrete flume coating was used in the tunnel at the rate of 1 gallon for 125 square feet on the prime coat and 1 gallon for 100 square feet on the finish coat.

Gunite Work in Borel Canal

Borel Canal was accessible, if a man had any imagination at all, by a number of old construction roads which the Southern California Edison Co. has kept in shape over the years. Project Manager Harwood L. Jones brought compressors, tractors, concrete mixers, Skimobiles, supply and other trucks in over rugged roads.

Fifteen canal sections through extremely rough mountainous terrain and ranging in length from 70 to 2,600 linear feet were cleaned and re-coated with Gunite. In cross section the canals are 9 feet deep with a 23-foot bottom width and side slopes of 1 to 1.

Water was cut off at the Kernville diversion dam on October 15, 1945, and 62 calendar days were allowed for the work to be completed. All algae, loose mortar, debris, sand, gravel, and boulders were removed from the sides and bottom. After the canal sides were cleaned as well as possible by wire brooms, they were given an air jetting, or a sandblasting by Gunite equipment.

Mr. Jones organized his canal Guniting into three similar crews, each crew with the same number of men and equipment, and worked each crew one 10-hour day shift. Credit is due Vinson's Gunite Superintendent and foremen who took green men and developed efficient crews on the job. Each crew was set up as follows:

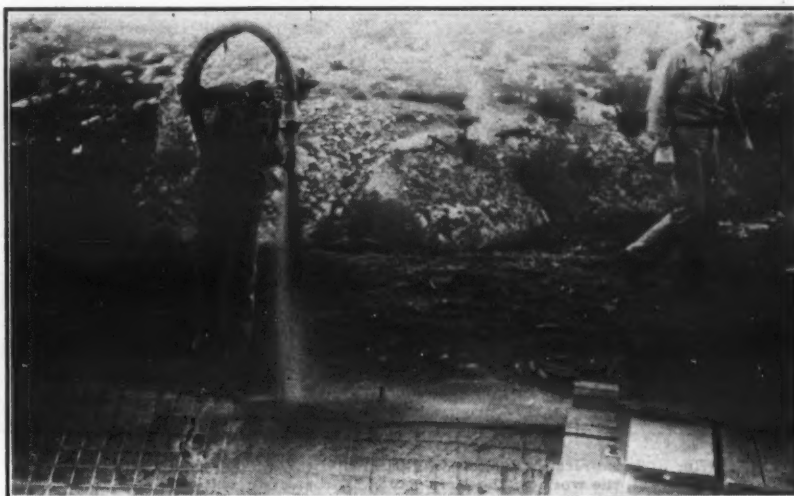
EQUIPMENT

- 1 International rubber-tired tractor
- 1 Rex or Ransome 10-S or 14-S mixer
- 1 Schramm 500-cfm portable air compressor
- 1 M-2 Gunite gun
- 1 Gunite-gun buggy
- Hand shovels, wire brooms, and a reinforcing mesh hook.

LABOR

- 1 Gunite foreman
- 2 Nozzlemen on Gunite gun
- 1 Gunner
- 4 Gun-buggy operators
- 1 Compressor operator
- 2 Cement finishers
- 10 Laborers

The equipment was hooked together in the order listed, with the International tractor towing all the other machines. It was moved from one set-up to the next by bringing in a Lorain 40 truck crane, rented from Pacific Crane & Rigging Co. of Los Angeles, picking each piece of equipment out of the canal, and setting it out on the access road. When the tractor had towed them all to wherever the next work schedule was located, the truck crane was used to pick up the machines again and set



Guniting in progress on a canal side. To reline old canals near Isabella, Calif., the sides and bottom were Gunited.

them in on the floor of the canal.

Sand for Gunite was graded at the company plant so that 100 per cent

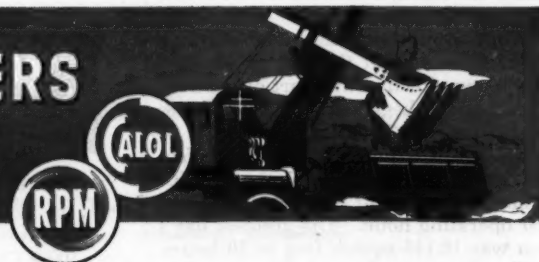
would pass a No. 4 screen but not more than 15 per cent would pass a 100-mesh sieve. It was hauled by dump truck to

the work site and dry-mixed in the concrete mixer at the ratio of 1 part portland cement to 4 parts of sand. At the time of mixing the moisture content of sand was from 3 to 5 per cent. It was mixed at least 1½ minutes at a drum peripheral speed of 200 fpm. The mixers were equipped with automatic dump controls which guaranteed the mixing time.

The dry mix was then dumped to the Gunite gun, where feed wheels picked it up and sent it into a pressure chamber. It was discharged from this pressure chamber through a feed hose and nozzle at a pressure of from 35 to 50 pounds psi. Water was hauled in by 1,500-gallon tank trucks and fed to the mix at the nozzle through a special feed ring at about 15 pounds psi greater than the sand-cement pressure at that point. This feed ring could be adjusted so the mix might run a range from powder dry to sloppy wet, but the best Gunite went on with the consistency of thick paste. Gunite applied at that consistency stuck

(Continued on next page)

STANDARD ENGINEERS NOTEBOOK



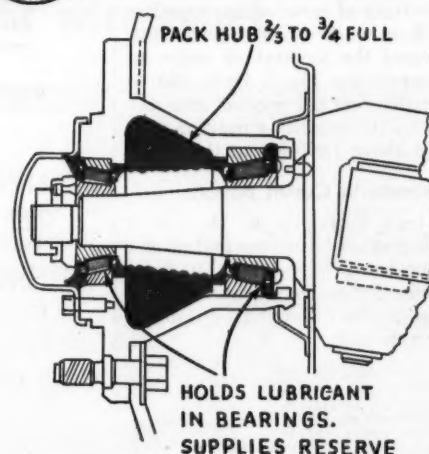
Compounded lubricant prevents gear scoring

Many operators of automotive equipment have eliminated transmission and differential trouble by switching to RPM Gear Lubricant (Compounded). It is recommended for all transmissions and all conventional differentials. (RPM Hypoid Lubricant should be used in hypoid differentials.)

The compounds in RPM Gear Lubricant assure that a tough, oily film will remain on gears when pressure and heat become excessive. A highly effective foam inhibitor prevents retention of air in lubricant, poor distribution and "boiling up" to cause leaks.

RPM Gear Lubricant (Compounded) is non-corrosive. It comes in four grades: SAE 80, 90, 140, 250.

For complete information about automotive drive gears and their lubricants, write for the new, free booklet: "The Lubrication of Automotive Gears."



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Because RPM Wheel Bearing Grease absorbs the countless shocks on wheel bearings, and stays put in extreme temperatures, it will prolong the life of properly adjusted wheel bearings.

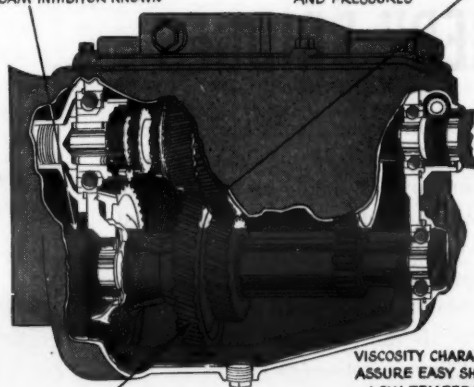
RPM Wheel Bearing Grease is specially made for wheel bearings — both the roller type and the ball type. It will not throw out and melt unduly even in hot weather. In any weather it feeds in the proper amounts onto all parts of bearings providing a uniform, tough lubricant film. The resiliency of this film reduces vibration that might rack wheel bearings and steering gear assemblies.

Water resistant, RPM Wheel Bearing Grease helps bearing seals keep out moisture. It seals out grit and dust, too.

For complete information, write for the free booklets, "How To Service and Lubricate Wheel Bearings." There's one for heavy-duty trucks and trailers and one for light equipment.

RPM GEAR LUBRICANT (COMPOUNDED) CONTAINS THE MOST EFFECTIVE FOAM INHIBITOR KNOWN

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FOR EVERY JOB A STANDARD OF CALIFORNIA TEST-PROVED PRODUCT

Tunnel and Canals Restored by Relining

(Continued from preceding page)

well with a minimum of particle rebounding, and test cylinders showed a compressive strength of 6,000 pounds psi at 7 days.

The Guniting had to be applied 1½ inches thick, centering in its middle a web of 4 x 4-inch No. 12-gage steel reinforcing mesh. The spacing of this wire mesh was handled by a laborer, who used a hook at the end of a long pole. He worked immediately behind the nozzleman. About every 2 square yards this man would reach out with his hook and lift the wire off the side slope while the nozzleman built the Guniting up under the wire. When the hookman released the mesh, it stayed in the center of the Guniting about ¾ inch off the old slope. This method was faster and more economical than spreaders under the mesh, according to Mr. Jones, and equally accurate.

Work joints were left tapered on a 45-degree angle at the end of the day, and blown down at the start of the next shift. Work began on the canal sides on November 12 and was finished in 31 shifts. In this time 418,555 square feet was applied, at an average rate of 13,502 square feet per shift or 1,350 square feet per operating hour. The greatest day's run was 18,146 square feet in 10 hours.

The Guniting of canal sides, together with the floor work which follows this, has increased the amount of water at Borel Powerhouse No. 3 from 560 to 600-plus cubic feet per second, thus restoring it to its original condition and picking up about 1,000 kw at the plant.

Concrete in Canal Bottom

The 3-inch surfacing in the canal bottom was made of concrete and placed by two crews working one 10-hour shift. Each of these crews was divided equally, with the following equipment and labor available:

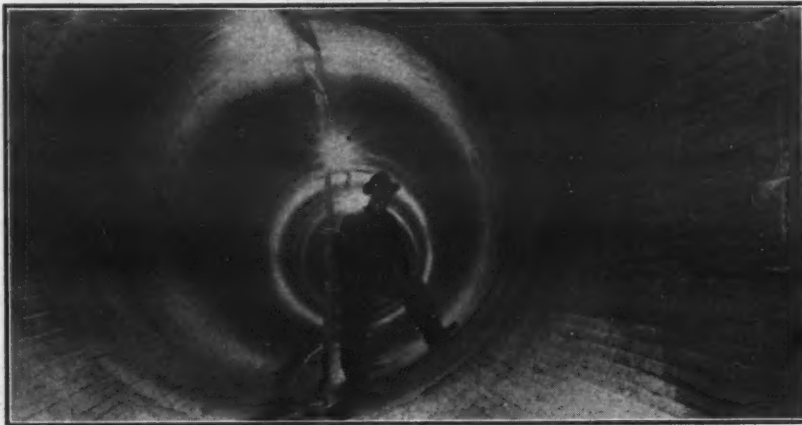
EQUIPMENT

- 1 Ransome 27-E concrete paver
- 3 Buggymobiles, 1-yard capacity
- 1 Wisconsin-powered mechanical concrete finisher
- 2 Dump trucks, 3-yard capacity
- 2 Water tank trucks, 1,500-gallon capacity
- 1 Water reservoir, 1,500-gallon
- 1 Pressure pump, 3-cylinder, two-stage
- 2 Over and under platform dial scales

LABOR

- 1 Concrete foreman
- 1 Sublabor foreman
- 1 Mixer operator
- 1 Oiler
- 3 Buggymobile operators and 2 truck drivers
- 5 "Mud-cutters" (tamers and rough finishers)
- 4 Cement finishers
- 12 Laborers

The concrete was designed by Southern California Edison Co. engineers on a water-cement ratio of less than 7 gal-



C. & E. M. Photo

The interior of this pressure conduit was painted with Arco asphaltic paint as part of the work on the Kern River hydroelectric system.

lons per sack, with 5 sacks of cement per cubic yard. Coarse-aggregate specifications provided for progressive gradation; 100 per cent passing a 2-inch mesh and 100 per cent retained on a

No. 4 screen. Sand specifications were the same as for the Guniting.

Concrete was mixed 1½ minutes after being batched by weight by laborers with wheelbarrows. The platform scales

were set up between the sand-aggregate piles and the mixer. Men with wheelbarrows hauled a constant weight each trip by checking the loaded wheelbarrow across the scales. Any deviation was corrected by one laborer with a shovel who added to or took from a load not exactly right. With a few shifts' practice, however, many of the men became quite skilled in taking the right amount of sand or aggregate. Monolith Type II portland cement in bags was used. The bags were opened and dumped in the paver skip.

Mixed concrete was discharged to 1-yard Skipmobiles and hauled to the placing site. The distance was 500 to 1,500 feet. All screed boards used in the bottom of the canal were trimmed exactly 3 x 3 inches square. A Wisconsin 1-cylinder gasoline engine was hooked to an eccentric flywheel and set on a steel-plate skid. When this skid was placed across the screed boards and dragged along with the gasoline engine running, it vibrated the bottom slab

(Continued on next page)

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These Features Make It Your
Best Choice—

100% CABLE CONTROL OF BUCKET
Permits gradual dumping of the load.

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WEIGHT CENTERED ON TRACTOR
FRAME—

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BUCKET CAN REACH OVER CENTER
OF TRUCK BEING LOADED—

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LOW OVER-ALL HEIGHT FOR
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You can simplify and speed construction of small bridges, culverts and large sewers by using ARMCO MULTI PLATE. Assembling and bolting are practically as simple as changing an automobile tire. The easily-handled, pre-curved corrugated metal plates are nested together to save space in shipping, hauling and storage. Unskilled men quickly install your "packaged" structure with the simplest equipment and small tools.

The MULTI PLATE "form" is the completed structure. No curing, no waste, no delay. Other operations go faster too.

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ARMCO

MULTI PLATE



Construction of this twin-arch bridge was simplified and speeded through the use of ARMCO MULTI PLATE. Each arch has a span of 14 feet and is 45 feet long.



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4-80,000 C.P. floodlights.

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LIGHT—Where you want it—
when you want it.
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saws, drills, hammers, etc.
Floodlight and Searchlight Units up to 14
million candlepower.
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Tunnel and Canals Restored by Relining

(Continued from preceding page)

thoroughly and left the surface smooth and ready for the first finishing. The finishers used steel trowels to work the surface about 2½ feet out from each toe. The other 18 feet was troweled by a Wisconsin-powered mechanical machine with four trowel blades.

A total of 250,000 square feet of canal-bottom concrete had been placed in 42 shifts when the job was visited for *CONTRACTORS AND ENGINEERS MONTHLY*, for a daily shift average of 6,197 square feet. The best day's run was 13,565 square feet. Performance fluctuated with Project Manager Jones' ability to cope with rain, snow, and bad roads which made the movement of construction equipment extremely difficult.

Tunnel Gunite

When the water was first cut off at the Kernville diversion dam and the representatives of the contractor and Southern California Edison Co. walked through the tunnel, the walls and floor were wet but there appeared to be only a few small springs and seeps from the outside. What seemed to be normal dampness turned out to be one of the big troublemakers of the job, ground water and plenty of it. For a few weeks after the water was cut off, there was little difficulty, but a deluge of autumn rain then fell on the Sierra Nevadas, and water trouble began again.

Drain sumps were placed in the tunnel floor and air pumps brought in to remove the water there. Where bad leaks appeared in the tunnel walls or roof, jackhammers were used to sink a small hole where the leak was most pronounced. A 12-inch length of ordinary single-strength pipe from 1 to 2 inches in diameter, depending on the size of the leak, was driven in. Then the special patch crews were brought in, with bags of high-early-strength Velo cement and cans of Anti-Hydro liquid chemical reagent.

Velo cement and Anti-Hydro were mixed with trowels in tin pails and the mix smeared or daubed on porous spots in the tunnel wall. It set up so rapidly that a man had to work fast to empty his pail before initial hydration occurred. The porous spot was thus completely sealed, leaving the pipe in place and presto! the pocketed water poured like an artesian well from these pipes. Hundreds of feet of tunnel were dried up in this manner. After standing 24 hours, the walls were then dry enough to take a ½-inch coat of Gunite with good bond. The pipes were trimmed off with a hacksaw after the Guniting was done.

Cleaning tunnel walls was another problem. All algae, old concrete, shreds of loose rock, and other debris had to be removed thoroughly before the Gunite would bond properly. Wire brushes in the hands of workmen were cumbersome, costly, and slow. Power brushes on air guns had about the same disadvantage.

Credit for the solution to this money-losing problem goes to Joseph P. Frein,



C. & E. M. Photo
Enamelers tend heating kettles at the Brush Creek siphon as a Case-engine-driven blower sends air to the men who are enameling inside the 650-foot tubes.

Morrison-Knudsen's District Engineer in the Los Angeles branch office. He proposed and sketched a jumbo-mounted brush which Mr. Fuller him-

self, with the help of all his salesmen, would have been proud to dream up.

The timber jumbo was built sturdily and bolted together to correspond

roughly with the height and width of the tunnel. It was mounted on swivel casters. On each side of the jumbo, a free-floating 3 x 8-inch timber was placed vertically, and separated by screw-type trench jacks. Coil springs were suspended by plates on the trench jacks in the middle of the jumbo, and smaller coil springs were placed outside the jumbo between the main frame and the 3 x 8-inch timber.

Dozens of heavy wire bristle brushes were then bolted to these vertical 3 x 8's. They were set on a 45-degree angle or more so they would be self-cleaning. The timbers were covered solidly from tunnel roof to the floor with brushes. Tension was put on the screw jacks to shove the brushes out against the wall and continued until the coil springs were compressed. The whole weird contraption was then drawn through the tunnel by an electric tractor. The built in "knee action" of the coil springs caused the brushes to flex in and out where the dimensions of the tunnel wall

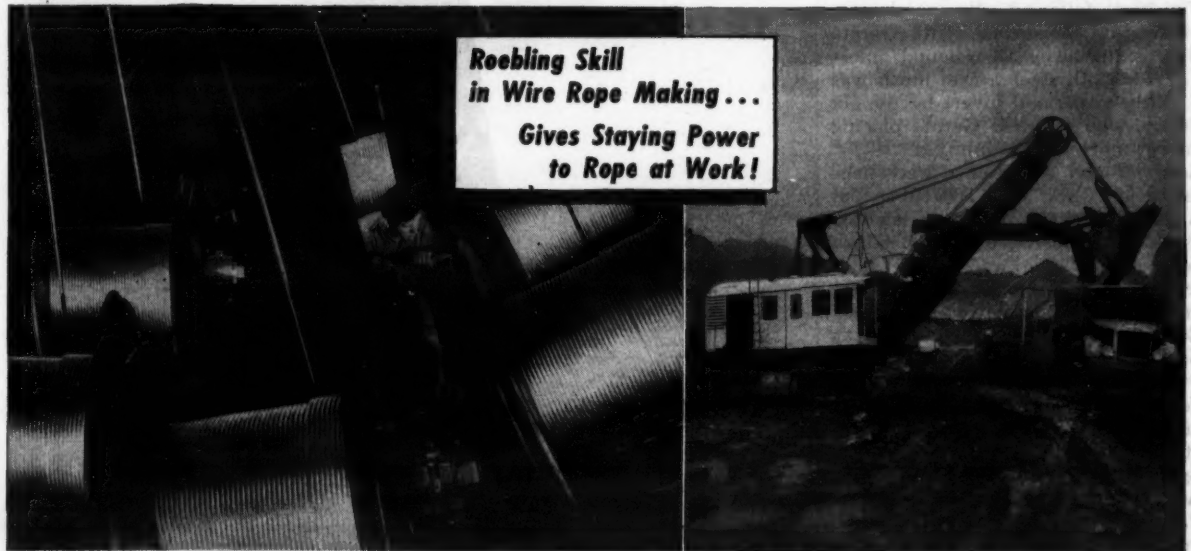
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(OLD MAN COMPETITION)

**Keep production up—costs down—
use the right wire rope!**



**Roebbling Skill
in Wire Rope Making...
Gives Staying Power
to Rope at Work!**

SUCCESSFUL BUSINESS OPERATION in the face of growing competition will force utmost economy from all industrial equipment and supplies. Production costs must be kept to a minimum.

Roebbling wire rope can help do this job. It is economical because of its low average cost, its toughness, its reserve strength under all conditions of operation. It helps *save* while it *serves*!

The modern facilities and craftsmanship of America's first wire rope maker are unsurpassed. Constant research and practical engineering back every phase of Roebbling operation. Vital factors like these make Roebbling "Blue Center" Steel Wire Rope the choice to help you produce in volume... keep costs down... meet competition profitably.

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WIRE ROPE AND STRAND • FITTINGS • SLINGS • SUSPENSION BRIDGES AND CABLES
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Tunnel and Canals Restored by Relining

(Continued from preceding page)

were uneven. It did a remarkably good job of cleaning walls. About 1,000 feet could be cleaned at once when the job was coordinated, and about a dozen trips were necessary. What few dirty spots or holes were left after this machine had done its work were then buffed up by laborers who used brush wheels mounted on air guns. Material removed by the jumbo worked its way off the slanting brushes and fell to the floor, from where it could be carted away.

Guniting crew labor in the tunnel was about the same as on the canal sides, but instead of having the machines all hooked together the mixer was spotted at either end of a tunnel section and the dry-mixed material was hauled in to the Guniting machine by six battery-operated Rocky Mountain Pony Express tractors. Each of these silent little workers would haul two trailer loads of mix, which was shoveled into the Guniting gun. Tunnel Guniting was mixed and applied the same as on the canal sides, except that the 1/2-inch thickness had to be placed to little or no tolerance. It had to be 1/2 inch thick to satisfy Southern California Edison Co. specifications, and more than that would lose money for the contractor as well as reduce the carrying capacity of the tunnel. No reinforcing mesh was required.

Finishers followed the nozzleman, smoothing off the surface of the Guniting and brushing away all rebound material. A smooth steel trowel finish was put on the walls and invert by the six finishers, who followed Guniting placing by never more than 45 minutes.

Long air and water lines were necessary here, for the 500-cubic-foot Schramm compressors were spotted outside. Air lines were 2, 3, and 4-inch quick-coupled pipe and water lines were 2-inch diameter, of screwed construction. A secondhand story was making the rounds there... perhaps it's apocryphal... about an ex-Seabee who got a job on the pipe gang. "The only difference between this job and construction work under Naval officers is that here only the pipe joints are screwed up!" he said.

At the time the job was covered, 359,812 square feet of 1/2-inch Guniting had been placed on tunnel walls in 44 shifts, or an average of 8,178 square feet per shift. High production on this phase was 22,362 square feet in a shift.

On the tunnel floors, 130,590 square feet of 1-inch Guniting was placed in 37 shifts, for an average production of 3,530 square feet per shift. The record was 8,628 square feet.

Aggregate Plant

In order to get sand and gravel for the Guniting and concrete work, the contractors developed their own supply from company property on the Kern River rather than haul it from Bakersfield over tortuous State Highway 178, which winds 48 miles through the mountains between that city and the center of the job.

A simple unit, consisting only of a jaw crusher, trammel screen, and conveyor belt, was rented from the Brown-Bevis Equipment Co. and set up in a catch basin below the Kernville diversion dam. This catch basin had for years been a natural classifier. Boulders, gravel, sand, and silt were found in just about that order where high-river stages washed it downstream from the Kernville diversion dam spillway. Well graded material which met the specification requirements was therefore quite easy to produce without elaborate equipment.

Material was excavated by tractor-scraper, dumped through a grizzly, and passed through the portable plant. From the plant to stockpiles it was transported by dump truck.

Painting

The interior of the Brush Creek inverted siphon with a 650-foot raise and fall was flame-cleaned, sand-blasted, and painted inside with hot-applied Barrett coal-tar enamel. The enamel was broken out of steel containers, chopped up with an axe, and heated to 525 degrees F in gas-fired heating kettles. So inaccessible were many of these places that the enamel had to be poured through an opening and pulled up a small hand-rigged trolley to the brush men. It was applied in a shingle lap pattern 1/16 to 1/8 inch thick with tampico fiber daubers, and checked for holidays with a spark detector.

Fresh air was supplied to the painters by a Case-industrial-engine-driven blower fan, which delivered 12,500 cubic feet of air per minute in the pipes. The

fan was driven by multiple V-belts.

Personnel

In addition to Project Manager Jones and Cost Engineer Oswald, the personnel for Morrison-Knudsen and Vinson Construction Co., joint contractors for this project, included Tom J. Collins, Tunnel Superintendent; Hale Criner, Canal Superintendent; H. O. Davis, Office Manager; and Bill Gardner, Master Mechanic.

W. L. Chadwick was in charge of the work for the Southern California Edison Co. and O. N. Kulberg was the company's representative on the job.

Auxiliary Equipment

For Tractor Mounting

"The secret of contracting profits is good equipment," the Hyster Co. of Portland, Ore., and Peoria, Ill., points out in a new catalog devoted to its line of tractor equipment for contractors. The Hyster line features cranes and winches for mounting on Caterpillar

tractors.

Most of the illustrated 16-page booklet is devoted to the new Hystaway, which combines dragline, clamshell, and crane with the track-type tractor and bulldozer. This highly mobile unit can be mounted on the rear of a tractor within 2 hours and removed, if necessary, in half that time.

Also covered in the brochure are Hyster winches and double drums, and their use in land clearing, construction, lifting, hoisting, towing, erection, wrecking, and other duties is illustrated. The Hyster crane is shown in action, and the various other members of the Hyster line, including tractor yarders, towing winches, auxiliary drums, worm-drive winches, and utility winches, are pictured.

Copies of this new booklet, "Hyster Money Makers for the General Contractor", may be obtained by readers of CONTRACTORS AND ENGINEERS MONTHLY on mention of this notice. Write the Hyster Co. at 2952 N.E. Clackamas St., Portland 8, Ore.



HIT IT

MARFAK STAYS PUT

Hit it as hard as you can, Marfak cushions the blow, doesn't splatter — stays in the chassis bearings.

GREASE SPLATTERS

Even a light blow sends ordinary chassis lubricant flying in all directions — leaving parts unprotected.



TEXACO

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHT

Rubber-Tired Trailer Has 2-Way Side Dump

A rubber-tired trailer, the PD-10, for use in combination with the Caterpillar DW-10 wheel-type tractor, has been announced by the Athey Products Corp. This new Apcor equipment is capable of an 18-mph travel speed, and has a 15-ton capacity. It features two-way dumping as a means of saving maneuvering time.

The trailer wagon is 21 feet long, 9 feet 4 inches wide, and varies in height from 7 feet 2 inches to 7 feet 10 inches. It has a struck capacity of 8 cubic yards and 10 yards heaped. A reinforced all-steel body is tilted by a telescoping hydraulic hoist. The operator controls the two-way dumping by locking either side of the body. Downward folding doors discharge the load clear of the wheels and over the fill. A full-dumping angle of 55 degrees can be achieved in 23 seconds. Large, easy-rolling, dual pneumatic tires reduce rolling resistance at high speed, and provide flotation over soft ground. Hydraulic air brakes are operated from the tractor-brake controls.

Construction men desirous of further details about the PD-10 may obtain them by writing the Athey Products Corp., 5631 W. 65th St., Chicago 38, Ill. A broadside, Form 448, describing this new Apcor unit is available on mention of this news item.

Blue Ridge Parkway Work To Resume This Summer

Provided labor and materials are available, work will be resumed this summer on the Blue Ridge Parkway, the Public Roads Administration has announced. More than half the 575-mile highway had been completed, or was partly completed and in usable condition, when war interrupted the work. Grading has been done, and asphalt surfacing placed on 171 miles of the project, and all but the asphalt top completed on an additional 150 miles.

Extending from the south end of the

Shenandoah National Park to the Great Smoky Mountains National Park, the Parkway is substantially completed from Shenandoah to U. S. 80, and from Adney Gap near Roanoke, Va., to Bull Gap within 10 miles of Asheville, N. C. Work authorized for this summer includes about 110 miles of asphalt top course, eight bridges, and about 35 miles of heavy grading and base course.

Plans for work estimated to cost more than \$12,000,000 have been completed by the PRA. Approximately one-third of this amount will be expended by the National Park Service. Additional work is to begin as Federal funds become available.

Hi-Way Service Renamed

The Hi-Way Service Corp., 5141 N. 35th St., Milwaukee 9, Wis., of which E. A. Drott is President, has changed its name to the Drott Mfg. Corp. The firm makes the Drott line of Bull Clam shovels, loaders, cranes, and other road-building equipment.

AED Views Problems At Its Annual Meeting

Surplus Property, Labor, Fair Trade, MVA, and the Future Among Subjects Discussed at Chicago Gathering; New Officers for 1948

(See photo on page 50)

THE construction industry and its allied fields "constitute the nation's biggest employment market" and any factor or combination of factors that continue to stand in the way of resuming and continuing a full national construction program "will be responsible for paralyzing, not alone the specific industries involved, but the entire national economy", Harry A. Dick, President of the Associated General Contractors of America, told the 27th Annual Meeting of the Associated Equipment Distributors in Chicago January 28-31.

The construction industry is aiming at attaining a rate of \$12,000,000,000 this year, and expanding during the next few years to the \$20,000,000,000 level, Mr. Dick revealed. It should offer jobs and opportunities for nearly 10,000,000 within a few years, he said.

Surplus Property Changes

Plans are now being executed to expedite the "greatest bargain sale in history", John S. Cooke, Vice President of the Consumers Goods Division of the newly created War Assets Corp., told the AED. Under a new surplus disposal policy, regional officials will be given greater authority to plan and promote sales campaigns, he promised, explaining that the surplus program had finally matured. The War Assets Corp. has now worked out a procedure under which equipment will be automatically offered to priority buyers, and, if not sold to them, will be available for regularly scheduled spot sales.

Between April and December of last year, the surplus agency acquired \$61,000,000 worth of construction and farm equipment. Of this, 41 per cent was sold to dealers, the balance going to priority holders. Much of the \$300,000,000 worth of equipment which is expected to be declared surplus in the near future will be in unused condition, Mr. Cooke reported.

Labor-Trade Practices

"There has been a tendency on the part of labor to fall down on the job of putting in an honest day's work for an honest day's pay", A. E. Paxton, publisher of *Construction Methods and Engineering News-Record*, asserted. The construction industry faces a long-range period of activity never before approached, he claimed, reporting that there are on schedule engineering projects having a total worth of more than \$28,000,000,000. Mr. Paxton told the AED that many labor leaders do not seem anxious for runaway increases in wage rates, seeking rather to bring the levels about 15 per cent above those of January, 1941.

The value of cooperative effort by industry members to formulate fair-trade practice rules and to carry them out in business was described by Henry Miller, Director of the Trade Practice Conferences of the Federal Trade Commission, sponsor of the fair practices plan. "Self-regulation and self-control in business, with the aid of the Commission, will be more effective than legal processes", he told the group. "Competition vigorously pursued on a free and fair basis is truly the 'life of trade'. Wholesome competitive effort must be maintained on the basis of equitable practices. Therein lies real support for conditions favorable to the expansion and development of economic well-being."

(Concluded on next page)

HARD

Find out why maintenance costs less

THIS simple "hammer test" proves that *Texaco Marfak* is super-tough, adhesive and cohesive — stays right where you put it despite heavy loads and hammering shocks. It gives greater protection with fewer applications, makes parts last longer. That's why operators everywhere use *Marfak* to reduce maintenance costs.

To prolong the life of wheel bearings, use *Texaco Marfak Heavy Duty*. It stays in the bearings despite high speeds, heavy loads and extremes of temperature — sealing out dirt and moisture, sealing itself in, assuring safer braking. No seasonal change is required.

For Texaco Products and Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

AED Views Problems At Its Annual Meeting

(Continued from preceding page)

Servicemen and the Future

"If man can learn to control his thoughts and his desires, he can learn to control the weapons of self-destruction", Lieutenant Commander John D. Lodge told the meeting, urging that man today "more properly address himself to an understanding and control of himself". A world contracted by science must be united by freedom if peace is to be preserved, the Commander asserted, maintaining that "an effective international program for peace cannot be one based on the subordination of self-interest—rather it must be one that harnesses this greatest of all incentives".

Speaking of the experiences of servicemen abroad, Commander Lodge claimed that seeing the ways of life of other nations has convinced the G.I. that the "greatness of America lies in the

greatness of its tools of production".

MVA Legislation

Socialism has been defined as "state electricity plus bookkeeping", Lachlan MacLeay, President of the Mississippi Valley Association, observed in an attack on the proposed Missouri Valley Authority. Calling the proposal a "further opening wedge to the complete economic and political control of the United States by an organized minority", he expressed the opinion of his organization that the bills for creating this Regional Authority are "the most outrageous socialistic legislation ever offered in the Congress of the United States".

Officers Elected

Frank B. McBath, of the Columbia Equipment Co., Portland, Oreg., was elected to lead the distributors for 1946, succeeding Hamilton O. Penn, whose sudden death during the meeting saddened his many friends and associates. William A. Danner of Parker, Danner

Co., Hyde Park, Mass., will serve as Executive Vice President. Other Vice Presidents chosen are A. F. Garlinghouse, Garlinghouse Bros., Los Angeles; C. F. Halladay, Western Material Co., Sioux Falls, S.D.; and Walter J. Kane, Kane-Gibb-Marr Co., Winnipeg, Manitoba. W. W. Bucher of the R. E. Brooks Co., New York City, was named Treasurer, and Carol F. Winchester, Washington, D.C., continues as Executive Secretary.

In addition to the four Vice Presidents, the following comprise the AED's Board of Directors: Harry J. Hush, Griffin Equipment Corp., New York City; George N. Crawford, G. N. Crawford Equipment Co., Pittsburgh; Robert H. Carter, Virginia Tractor Co., Richmond; Albert E. Hahn, Tractor & Machinery Co., Atlanta, Ga.; J. C. Williams, W. W. Williams Co., Columbus, Ohio; George W. Swart, Contractors Machinery Co., Grand Rapids; James W. Bell, James W. Bell Co., Cedar Rapids, Iowa; H. L. Burleson, Brown-ing-Ferris Machinery Co., Dallas,

Texas; Frank G. Connelly, Connelly Machinery Co., Billings, Mont.; W. G. Clark, Tri-State Equipment Co., Memphis, Tenn.; and W. A. Norris, Wortham Machinery Co., Cheyenne, Wyo.



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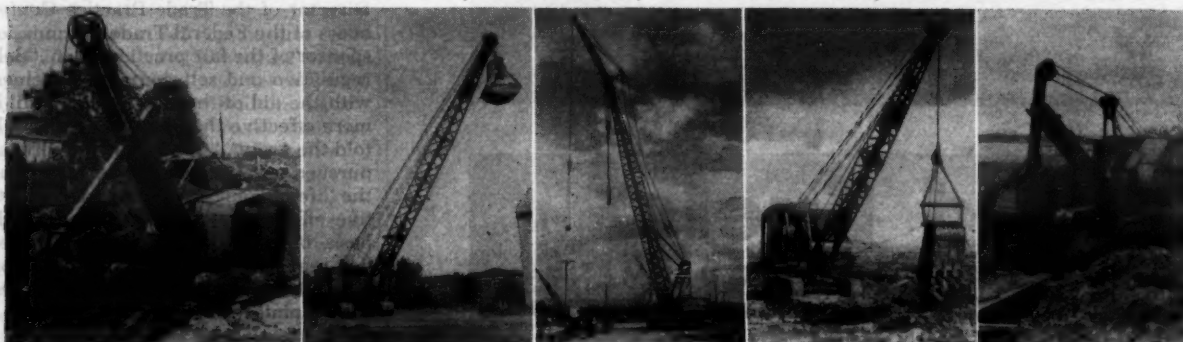
The quiet, easily controlled, coordinated performance of Bucyrus-Erie excavators results in greater output because it means less operator fatigue, less wear on the machine itself. The operator, working with easily manipulated responsive controls, finds it easy to keep a Bucyrus-Erie working at top speed without becoming excessively fatigued . . . without experiencing the end-of-shift slow downs that cut output. Smooth performance means more consistently efficient machine effort, too. It means that the operator gets full use of engine power all through the shift because losses due to friction and vibration are tremendously reduced. It means

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Ball and Roller Bearings, Their Care and Lubrication

Essential Anti-Friction Units Used Increasingly In Construction Machinery Need Only Minimum Care

ONE of the unseen elements of practically every large and small piece of construction equipment is one or more ball or roller bearings. They have become so standardized that their design and manufacture are the functions of specialists. They serve the purpose of reducing friction and are either the radial or axial type, although some of them can carry some load of the other type. These bearings consist generally of two rings which confine the rolling elements and a cage which separates the rolling elements. Most are self-contained and handled as units, although some are made up with two or three separable parts.

"Out of sight, out of mind" is too frequently the case with such a usually trouble-free unit as a roller or ball bearing, but there are certain facts which equipment men and operators should know regarding their lubrication and care which we are recording here for their guidance.

Lubrication

The functions of a lubricant in a ball or roller bearing, are four in number:

1. To help reduce internal friction.
2. To aid in the dissipation of heat.
3. To prevent rust and corrosion.
4. To act as a seal and help keep out foreign matter.

The first three are necessary in any type of application, while the fourth is only on specific applications, but is one largely met on construction equipment.

As in all lubrication, only first-quality greases and oils should be used in the lubrication of ball and roller bearings. The second most important item is that, in selecting the grease, consideration must be given to the operating conditions of the bearing. In this, temperature is of prime importance, and the sealing properties of the grease are important to keep out water and dirt.

Lime-soap greases are used at bearing temperatures of from minus 20 degrees F to plus 175 degrees F in some cases. They are less effective as a seal than soda-soap greases and, if the top temperature limit may be exceeded, they should be excluded as they separate into soap and oil and do not recombine on cooling. During the past few years, grease manufacturers have developed lime-base greases in which the water has been replaced by a higher-boiling-point material to act as a stabilizer. These greases can be used at even higher temperatures. Lime-soap grease is insoluble in water so that free water gaining entrance to the bearing causes rusting. Hence lime-soap greases should be used only in locations certain to be dry and dust-free.

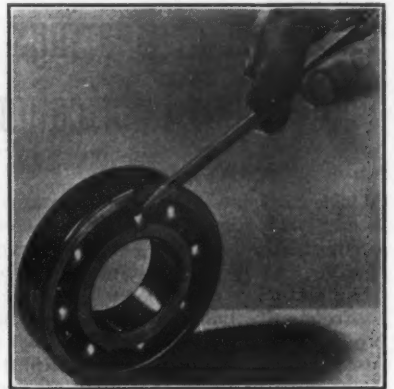
Soda-soap greases can be used between minus 40 degrees F and plus 250 degrees F, and in some cases as high as 350 degrees F; they give good seal against dust and dirt; may lose their sealing properties above 250 degrees F but do not separate; and if melted return to their original consistency on cooling. These greases can absorb more or less water without noticeable deterioration of their lubricating ability, and they form a rust-preventing emulsion when water is absorbed in limited amounts. For this reason they can be used in dusty as well as damp locations. If a large amount of water reaches a

bearing, some soda-soap greases emulsify completely and are washed out, permitting rust formation. This has led to the use of a mixture of four parts lime-soap grease to one part emulsifying oil. The action is then that, upon the entry of water, the soluble oil forms an emulsion with the water and thus protects the bearing against rust, and the non-soluble lime-soap grease continues to lubricate the bearing without deterioration. There are now on the market several non-emulsifying soda-base greases which are nearly as water-repellent as regular lime-soap products. These are particularly applicable where

the pressure of the water or the amount of water is sufficient to wash out ordinary soda-base greases.

Manufacturers of ball and roller bearings urge the careful selection of grease for quality and composition to insure dependable bearing service and to maintain the useful life of the unit.

Quality oils are more uniform than greases and are therefore selected mainly for the suitability of their viscosity for the bearing size, speed, and temperature. In many cases, the bearing load is an important factor in selecting the proper oil. High-speed bearings call for a Saybolt viscosity of 66 at 50 degrees C (122 degrees F). The exact bearing temperature, on high-speed installations, may be difficult to determine beforehand, because it depends, among other things, upon the amount of oil and its viscosity. Therefore, under severe operating conditions, and high-speed rotation, it is necessary to determine the proper grade of oil by test. On large moderate-speed bearings, such as on most construction equipment, vis-



More than 90 per cent of bearing failures are caused by dirt. Here is a broken separator, often due to the presence of dirt or grit.

cosity is of less importance, and heavier oils can be used. Spherical roller thrust bearings are almost always lubricated with oil. They operate at low speeds and consequently a heavy oil is satisfactory.

(Continued on next page)

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Removing excess material from ditch and shoulder.



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SINCE 1859

The Care of Bearings And Their Lubrication

(Continued from preceding page)

Where very low starting temperatures are involved, the oil selected must have a sufficiently low pour point to prevent the bearings from becoming locked by solidified oil.

Frequently ball and roller bearings are lubricated by the same oil which is used for gears and other machine parts. Care must be taken that dirty oil does not enter the bearings at any time.

Ball and roller bearings require only a very small amount of lubricant and its replenishment at only infrequent intervals. However, all such bearings do require lubrication or else the life of the bearing is jeopardized.

The length of time a bearing can operate without renewing the grease depends on the grease used, the speed of operation, the design and size of the bearing, and other operating conditions, including temperature. It is not possible to state accurately exactly when a lubricant should be added.

Time alone causes a certain deterioration in a grease and affects its lubricating and sealing qualities. Thus, after one or two calendar years, the grease in any important bearing should be replenished or replaced. In many cases the interval between greasing does not depend on the lubrication requirements of the bearing. For instance, if water cannot be prevented from entering the housing, as on most construction-equipment applications, grease is added much more frequently. Since these bearings operate generally at low speed, the housings are filled completely. The water-saturated grease is pressed into the seal labyrinths in order to exclude dirt.

On construction equipment, the main purpose of grease injection is to improve the seal, so grease is added until clean grease begins to come out at the labyrinth seal. If a bearing housing is opened for lubricating and if any dirt

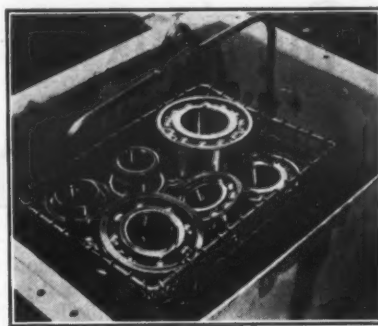
is discovered, it must be cleaned out by careful washing of the bearing with a clean emulsifying type of grease solvent.

Those bearings which are vital to the dependability of a machine, such as the main bearings on a power grader, or journal boxes of railroad cars, and which cannot be observed easily while in operation, should be thoroughly examined periodically and given new lubricant.

An important maintenance hint is given in one bearing manual. If, during the time a bearing is in service, some defect is indicated, the bearing should be examined immediately and special effort made to determine the cause. This makes it possible to overcome the cause of the trouble before the replacement bearing is installed and thus lengthen its service life.

What Causes Bearing Failures?

More than 90 per cent of bearing failures are caused by dirt that finds its way into the bearing, due either to



When washing bearings a clean emulsifying type of grease solvent should be used. While bearings can be dipped in a pail, a better way is to put them in a basket, one layer at a time, and suspend it in a tank of solvent.

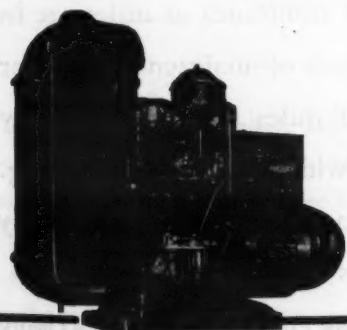
carelessness before or during assembly, or by the user after the machine has been placed in operation. Both ball and roller bearings provide actual metal-to-metal contact often under very high pressure. Dirt consists of an almost infinite number of exceedingly hard par-

ticles which, when mixed with the lubricant, make a grinding compound. Thus the revolving action of the balls in operation gradually wears away the original close fit of the bearing and destroys its accuracy and efficiency.

Manufacturers of ball bearings have invested thousands of dollars in elaborate equipment to clean bearings, and wrapping and packaging are done in air-filtered and air-conditioned rooms. They use packing greases of highest quality specially refined under conditions of great cleanliness. These are the precautions taken by the bearing manufacturer to be sure that the bearings are delivered absolutely clean. Carelessness can, in a few seconds, destroy these protective measures, shorten the life of the bearing, and result in early equipment breakdown.

Stock-Room Procedure

When bearings are received in a contractor's or in a highway department shop, the box seal should not be broken (Continued on next page)



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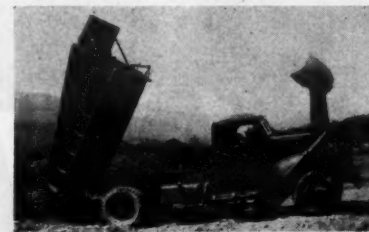
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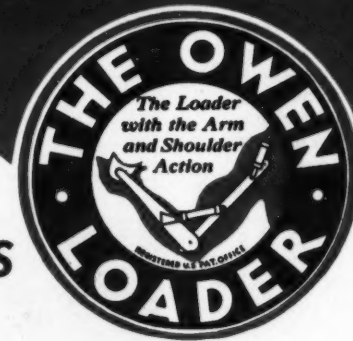


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Shown on Case Tractor Model-D1

Two Simple Levers Control the Double Hydraulic Action

The Care of Bearings And Their Lubrication

(Continued from preceding page)

and the bearings should not be unpacked to check the packing slip. Bearing numbers are usually printed plainly on one end of each box. The box markings, however, include the bearing number and a set of symbols used by the manufacturer to indicate internal clearance, etc., and all these symbols can be disregarded by the shipping clerk. There is also a set of symbols, usually letters, used before and after the bearing number to indicate a certain type of design of bearing. These symbols are part of the bearing number and are included upon packing slips, purchase orders, invoices, etc.

The stock-room foreman should check all bearings delivered to him by the receiving room. First, he should be sure that every box is sealed. In case the seal has been broken, remove the top lid and see if the wax paper in which the bearing is wrapped is broken or shows signs of having been opened. First determine if the seal was broken due to rough handling in transit or in unpacking. If it appears that the seal was broken due to carelessness, reseal with a piece of gum tape, if sure that no dirt or dust could possibly have reached the bearings. If the bearing box is badly mutilated and the waxed paper punctured or torn, the bearing should not be put into stock until it has been carefully inspected to determine whether dirt has found its way into the grease in which the bearing is packed. If it is necessary to wash a bearing, it should be done with a clean emulsifying type of grease solvent.

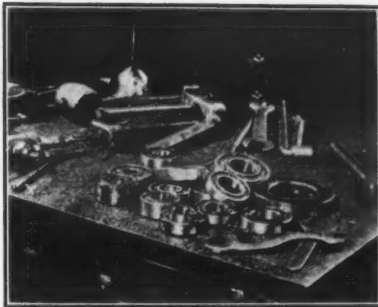
Bearings should be stored in a cool, dry place: cool, in order that the packing grease will not melt and drain to the lower part of the bearings; and dry, to prevent moisture penetrating to the bearing's surface and causing rust.

Another important stock-room procedure is always to place new bearings at the back of the pile, thus using up the oldest ones first. This procedure is especially advisable in the summer time when warm weather may liquefy the packing grease.

Installation

The critical period in the life of a bearing is when it leaves the stock room for the assembly bench, because it is going to be removed from its box and protective coating and is therefore at the mercy of the men who handle it. In construction equipment, the assembly of the bearing into the machine is a comparatively incidental part, as far as time goes, in the reassembly of the entire unit. Inasmuch as most of the parts in a machine can be handled without a great deal of damage if they come in contact with a little dirt, there is a tendency to handle ball and roller bearings in the same manner.

The first rule in handling bearings is clean hands and clean tools. Keep plenty of clean machinery wipers available and use them often. Do not use waste, as the lint and short strands adhere readily to oily surfaces. Keep the



A glaring example of how NOT to handle bearings. A dirty bench and tools can undo in a few moments the effect of all the care taken by the manufacturers to deliver completely clean bearings to their customers.

hands wiped dry.

Do not wash out the lubricant with which the bearing is greased at the factory. The manufacturer uses a high-grade non-acid lubricant, free from all chemicals and impurities which might cause corrosion. In a great many instances, it is necessary to add more

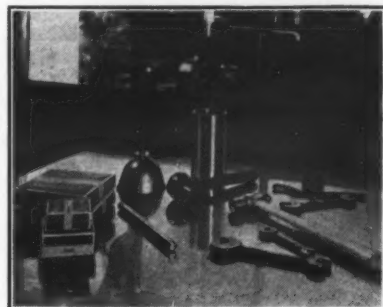
grease, but be sure that the lubricant added is absolutely clean. To assure this, the following routine is suggested:

1. Always keep the cover on the grease can, so that no dirt or dust can enter.

2. Be sure that the instrument with which you take the grease from the can is clean. Avoid the use of a wooden paddle but rather use something with a steel blade, like a putty knife, that can be wiped off smooth and clean.

3. In cases where a grease gun is used to introduce grease into a bearing chamber, after the bearing has been installed, observe the same caution as regards the cleanliness of the gun, especially the nozzle and the grease fittings. Be sure the assembly bench where the bearings are handled is as clean as possible and clean thoroughly the shaft and housing where it is to be installed, wiping them free of all possible chips, filings, etc. Wash them first in kerosene and then blow out dry with an air hose.

Cleanliness is the essential all through the handling of ball and roller bearings,



This working set-up might be described as ideal—but to protect your equipment, come as close to it as you can when handling bearings.

from the moment they reach the receiving room until they are finally completely installed on the equipment.

Bulletins on Bearings

Bulletins and information on ball and roller bearings are available to readers of CONTRACTORS AND ENGINEERS MONTHLY (Concluded on next page)



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Cleaned oil bearings which are to be re-used fairly soon should be kept in a clean covered box until ready to be reassembled in the equipment.

The Care of Bearings And Their Lubrication

(Continued from preceding page)

ly from many sources. Among those used in the preparation of this article are:

Ball and Roller Bearing Information Center, 16 East 48th St., New York 17, N. Y.

"Ball and Roller Bearing Engineering", by Arvid Palmgren, in charge of engineering and mechanical research, SKF Industries, in Sweden.

"Tyson News", published by Tyson Bearing Corp., Massillon, Ohio.

Bulletins of New Departure, Division of General Motors Corp., Bristol, Conn.

"Lubrication Progress Paces Ball and Roller Bearing Developments", in *Lubrication*, Volume 31, No. 2, published by The Texas Co., 135 East 42nd St., New York 17, N. Y.

"Schedule of Lubricants Recommended for Ball and Roller Bearings", in *Lubrication*, Volume 31, No. 8, published by The Texas Co.

"Ball Bearing Practices for the Shop Man", a series of bulletins published by Marlin-Rockwell Corp., Jamestown, N. Y.

"Maintenance Handbook", issued by Hyatt Bearings Division of General Motors Corp., Harrison, N. J.

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terested in a new booklet issued by the Eccles & Davies Machinery Co. The publication, "Edco Electrodes", gives detailed descriptions of the physical and chemical properties of Edco phosphor-bronze electric welding electrodes. The technique of welding copper, bronze, cast iron, steel, and their alloys is presented, with directions for obtaining the best results.

Copies of this 16-page booklet may be obtained by C&E MONTHLY readers who mention this notice when writing to the Welding Division, Eccles & Davies Machinery Co., Inc., 1910 Santa Fe Ave., Los Angeles 21, Calif.

Open-Bowl Scrapers To Match Tractors

Open-bowl scrapers, matched in capacity to the power of Caterpillar diesel tractors, are now being built in three sizes by the Caterpillar Tractor Co. The new units make it possible for the first time in construction his-



One of the three sizes of open-bowl dirt-moving scrapers now made by Caterpillar.

tory to present a matched earth-moving package designed and built by one manufacturer, the firm says.

The new scrapers have respective struck measures of 13.8, 8.7, and 6 yards. According to the manufacturer, the open-bowl design provides stability, visibility, and access for shovel or drag-line loading. The units have a high apron lift so as to clear the stickiest materials, and positive, clean ejection. Double-curved self-sharpening cutting

edges for "live loading" with long boiling action, digging hard material, short loading distance, and speedy loading are another feature. Optional tire sizes permit matching the tires to the job's requirements.

Specifications and full operational details on the new scrapers, Nos. 60, 70, and 80, may be secured by readers of *CONTRACTORS AND ENGINEERS MONTHLY* who write to the Caterpillar Tractor Co., Peoria 8, Ill.

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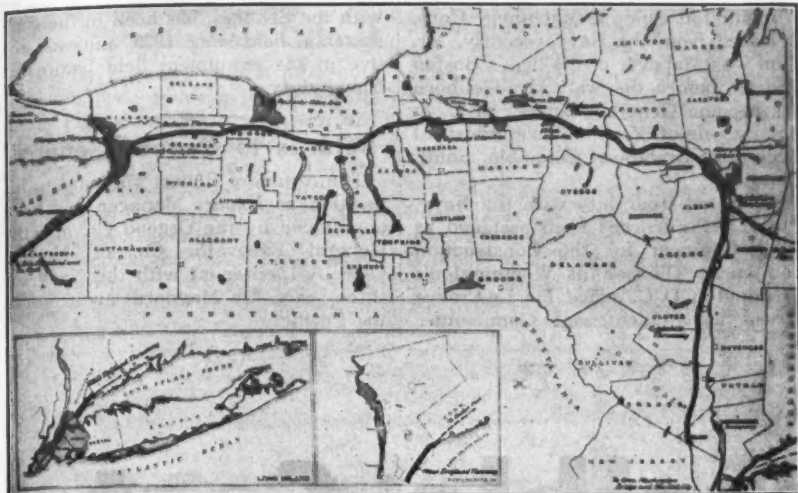


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The proposed New York State Thruway System will extend from New York to Buffalo.

Spring Start Planned For New York Thruway

Long awaited, the 486-mile expressway known as the New York State Thruway System is to enter the construction stage this spring, Superintendent Charles H. Sells of the State Department of Public Works has announced. Three, and possibly four, sections of the project are to get under way shortly.

Said to be the most important statewide project since the Erie Canal was built, the Thruway will span the state from the New York City metropolitan area to Buffalo and Lake Erie, traversing the most densely populated and highly industrialized sections to provide vitally needed arteries for the increasing flow of traffic in the state.

Running north from the New Jersey border, along the west side of the Hudson, the highway will follow the Mohawk valley westwards to Buffalo. This major section comprises the Catskill, Mohawk, and Ontario Thruways. The Niagara Thruway and the Erie Thruway will connect the Buffalo terminal with the Canadian and Pennsylvania borders. Near Albany, the Berkshire Thruway, connecting with Massachusetts, will join the Catskill route. A separate road, not yet linked to the rest of the system, will traverse Westchester County from New York City to the Connecticut line, and be known as the New England Thruway.

Initial work on the Thruway will be in widely separated sections. One project will be located on the Erie Thruway south of Silver Creek and extending from Cattaraugus County into Erie County. Work may also begin on the Ontario section in the vicinity of Victor in Ontario County. A section north of Syracuse has been chosen for the commencement of the Mohawk route. Work is also scheduled to begin on the Catskill Thruway between Catskill and Kingston in Ulster and Greene Counties.

As planned, the Thruway will be a multiple-lane highway with divided arteries separated by safety malls.

at any point, and a 2,800-foot minimum radius of curvature has been established. Urban centers are to be served by adequate arterial connections.

The entire route is to be devoid of obstacles to the easy flow of traffic. Intersections at grade will be non-existent, as will traffic lights. Cross traffic will be handled on bridges and underpasses. Acceleration and deceleration lanes will permit the traveler to enter or leave the route easily and safely. Planting will be done along the separating malls to provide effective screening of approaching headlights.

When completed, the artery is expected to relieve much of the present congestion on the state's major highways. Studies made by the Department of Public Works reveal that the existing roads in the region to be served by the Thruway have the heaviest traffic counts of any in the state. These studies also show that the belt extending for 30 miles on either side of the Thruway, while representing only 50 per cent of the state's area, provides

homes for over 90 per cent of its population. Almost as high a percentage of the state's vehicles are to be found within this region.

Crane Undercarriages And Heavy-Duty Trucks

Heavy-duty trucks and dump bodies for contracting operations, pneumatic-tire-mounted undercarriages for cranes, and winches and hoists are among the variety of products offered by Six Wheels, Inc., as part of its special equipment development work. The firm has extensive designing, developing, manufacturing, and installation services for unusual equipment needs. Its Maxi-Engineered crane carriages are available for use with seventeen standard makes of cranes, while its 25-yard dump trucks have seen service on many large dirt-moving jobs.

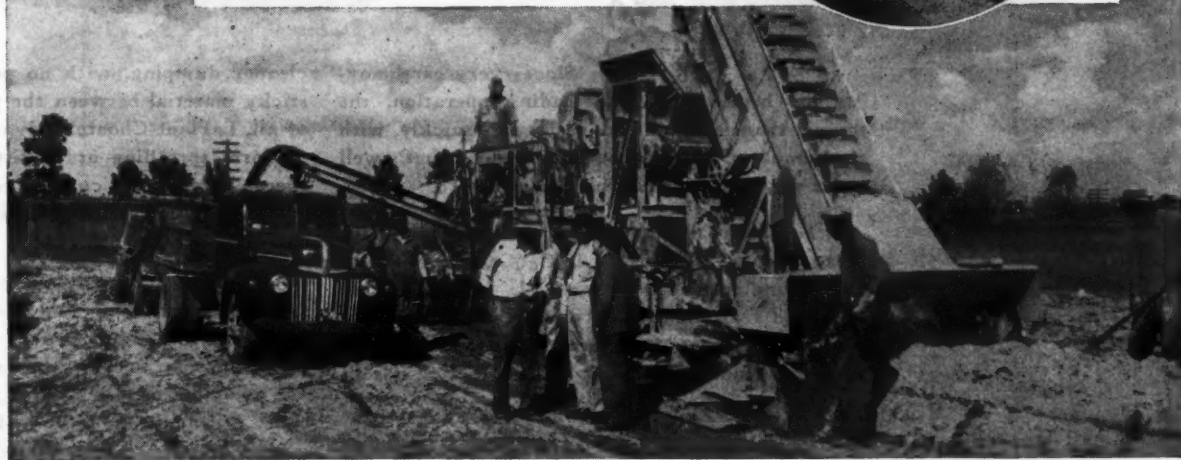
Literature describing its products and services may be obtained direct from Six Wheels, Inc., 1572 East 20th St., Los Angeles 11, Calif.

"Better equipment performance, lower maintenance costs—
that's been our experience

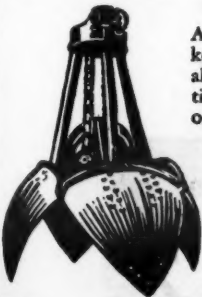
with **Gulf Lubricants and Fuels**"

says Superintendent M. M. Pace of W. L. Cobb, Inc.*

* W. L. Cobb, Inc., Decatur, Georgia, is the contractor on this million dollar highway project in Troup and Coweta Counties, Georgia. The job involves two miles of new construction, forty miles of widening, and three new bridges. This contractor operates its own quarry, crusher, and asphalt plant.



WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

"A SIZABLE SHARE OF THE CREDIT for our fast progress and low costs on this road job is due to Gulf lubricants and fuels," says Superintendent M. M. Pace of W. L. Cobb, Inc.* "With Gulf products we get efficient, dependable performance from every unit of equipment, and rock-bottom maintenance expense."

Here's how you can get effective help in improving equipment performance and reducing costs on your next job: Call in a Gulf Lubrication Service Engineer and ask him to recommend the proper type and grade of lubricants and fuels for each piece of equipment. From Gulf's complete line, he will select lubricants that provide maximum protection for your equipment under every operating condition—and fuels that insure efficient engine performance.

The helpful counsel of a Gulf Lubrication Service Engineer—and the Gulf line of quality lubricants and fuels—are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office.



Gulf Oil Corporation • Gulf Refining Company

Division Sales Offices:

Boston • New York • Philadelphia • Pittsburgh • Atlanta
New Orleans • Houston • Louisville • Toledo

Couplings and Fittings

For All Types of Hose

The Eastman line of hose couplings and accessories is described in two new catalogs, the first post-war publications of the Eastman Mfg. Co., 1004 N. 11th St., Manitowoc, Wis. One booklet, No. 46-H, covers Pressed-On and Renewable couplings and hydraulic-control hose units, and is arranged to show the assemblies best suited to particular needs. The other, No. 46-A, shows the line of Renewable and Barbed Insert

couplings, adapters, hose, and other items for maintenance shops, etc. New items include a brass air chuck and a torpedo-type blow gun.

Copies of Catalogs 46-H and 46-A may be obtained by CONTRACTORS AND ENGINEERS MONTHLY readers who write direct to the company.

Worthington Appointments

The appointment of W. A. Finn to succeed George Gellhorn as Export Manager has been announced by the

Worthington Pump & Machinery Corp. Released from the Navy recently, Mr. Finn was Manager of the firm's Boston District before the war. Mr. Gellhorn has become General Manager of C. E. Halaby, one of Worthington's industrial machinery dealers in Colombia, South America.

Separated from duty with the Navy, Paul La France has been assigned as Sales Engineer for the Construction Equipment Division at Worthington's Washington, D. C., office. Mr. La France served as a Lieutenant Commander

with the Seabees, has been in the construction field since 1925, and was active in the equipment field before his Naval duty.

Returns to Osgood-General

The return of Robert Maynard to his position as Export Manager has been announced by the Osgood Co. and the General Excavator Co. of Marion, Ohio. A Lieutenant with the Navy for three years, Mr. Maynard saw action in the Pacific.

Lowest Possible Cost

begins



Since every earthmoving job begins with the loading operation, the scraper that gets full loads easily and quickly, with a minimum of tractor power, is the one that's well on its way to lowest possible cost per yard.

For this reason it will pay you to compare the "load-ability" of the new LPC "Carrimors" with any other scrapers on the market. Look at all the advanced features LaPlant-Choate engineers have designed into these new scrapers, just to help you get peak loads faster and easier in all kinds of material.

Remember, too, that superior "load-ability" is only one of the reasons why you'll profit more with a "Carrimor". Low center of gravity, short wheel base and freedom from unnecessary dead weight mean that every ounce of tractor power is used to best advantage in handling maximum pay loads. Then, too, LaPlant-Choate's exclusive principle of positive forced ejection assures faster,

cleaner dumping, with no possibility of jamming sticky material between the gate and apron. Best of all, LaPlant-Choate's advanced design gives you uniform spreading at consistently higher tractor speeds because the cutting edge is positively controlled and completely independent of other moving elements.

Built by earthmoving specialists with over 33 years of engineering and manufacturing "know-how" and thoroughly proved on hundreds of tough jobs from coast to coast, these new LPC "Carrimors" are available now in 8- and 14-yard struck capacities. In addition, LaPlant-Choate is ready with a new line of 2- and 4-yard hydraulic scrapers, hydraulic dozers, power control units — *plus* (some time later this year) a sensational new development in high speed rubber-tired hauling rigs. So whenever you're ready to buy new earthmoving equipment, remember LPC — for lowest possible cost per yard. LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa; Oakland, Calif.

LaPLANT

Engineered

Clay Sewer Pipe Assn. Expands; New Offices

Plans for the expansion of its activities have been revealed by the Clay Sewer Pipe Association with the announcement that it has acquired larger quarters for its general offices. The organization is now located in the Huntington Bank Building, 17 South High St., Columbus 15, Ohio.

The research and promotional work of the Association, carried on in behalf of the engineering and architectural

field, the consumer market, and the manufacturers of clay sewer pipe and allied products, is to be greatly intensified by the addition of new personnel to its field engineering staff.

Arc Welding Accessories

Welding accessories and an extensive line of electrodes are featured in two new folders issued by the Hobart Brothers Co. Face shields, protective clothing, electrode holders, metal cleaning tools, cable, cable accessories, and

text books are among the items illustrated and described in Catalog DM-709.

Electrodes for carbon steel, low-alloy high-tensile steels, cast iron, stainless steel, and other metals are described in Folder DM-710. Five different brands of rods for hard-surfacing and building-up are shown. Besides a description and a list of applications for each type, the physical properties of the deposited metal and the characteristics of the electrodes are given.

These folders may be secured from

the Hobart Brothers Co., Troy, Ohio, on mention of this notice.

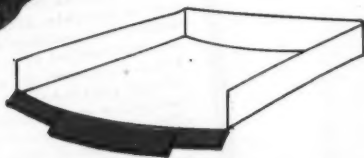
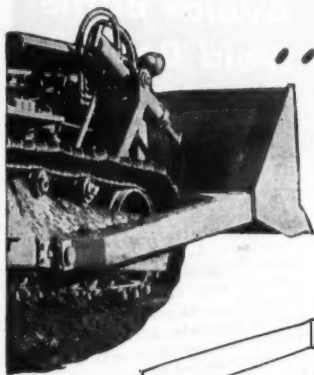
Joins Smith Booth Usher

Lynn G. Lawrence has joined the Smith Booth Usher Co., Los Angeles distributor, as Sales Engineer for San Diego, Ventura, Santa Barbara, San Luis Obispo, and Los Angeles Counties. Well known in the heavy construction field, he has been associated with various equipment distributors, the Caterpillar Tractor Co., and J. D. Adams Co.

per yard with the loading

here's why LPC scrapers get bigger loads

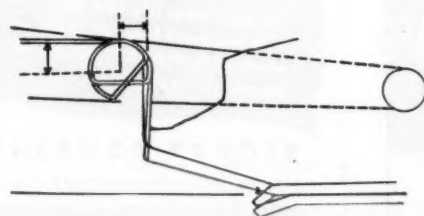
...faster-easier-with less power



Bowed Offset Cutting Edge



Exclusive "Fountain Action"



Eccentric Hoist Sheaves

Every LPC "Carrimor" feature is designed to cut seconds off loading time, add more pay load and cut power requirements. For example, the "floating" front apron provides a generous initial opening for loading, without any movement of the tail gate.



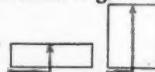
The bowed offset cutting edge gives you instant penetration in all kinds of material because all the weight can be concentrated in the center few inches of the digging element.



Once started, the earth is encouraged to flow into the center of the bowl in a continuous stream because the offset cutting edge naturally causes the scraper to cut slightly deeper in the center. Moreover, as the bowl begins to fill, the incoming material continues to "fountain up" through the center of the load, falling forward and to the rear until a full heaped load is obtained.



Since the LPC "Carrimor" is low and wide, instead of high and narrow, you get heaped loads faster with less power because the shorter the distance a given load has to be raised inside the scraper, the less the frictional resistance.



In addition, the bottom of a "Carrimor" bowl is curved and the interior is perfectly clean, with no obstructions to create friction or interrupt the fast free flow of incoming earth. Another exclusive

LaPlant-Choate feature that helps speed loading, especially in loose material, is the pumping action made possible by the use of eccentric hoist sheaves.



As these eccentric sheaves revolve, they constantly improve the leverage in favor of the cutting edge, thus producing a greatly accelerated downward throw which "pumps" sand and other material into the bowl with amazing ease. Equally important, since the LaPlant-Choate "Carrimor" has a wide, open-top bowl with no overhead obstructions, it can easily be loaded with a shovel or dragline and used for utility hauling and spreading.

Ask to see the new LPC's in action. Compare them with any other scraper you've ever used. Then you'll see why so many agree on LPC—for lowest possible cost per yard.

CHOATE

Earthmoving

lowest possible cost
per yard



Worthington Heads West Virginia Roads

Lean, scholarly E. L. Worthington has been appointed Commissioner of the West Virginia State Road Commission where he has been employed for the past twenty-three years, during the last eight of which he has held the important post of State Maintenance Engineer. Governor Clarence W. Meadows appointed Mr. Worthington to the vacancy created when Ernest L. Bailey resigned January 31 to form a partnership with N. P. Rhinehart for coal strip-mining operations in which field both men have had past experience.

The new 49-year-old Commissioner has long been regarded in highway circles as an authority on road maintenance, and he has also made exhaustive studies covering the construction and maintenance of bituminous surfaces, snow removal and ice control, and other phases of highway work on which he has written and presented papers at highway conferences throughout the

country. Last year Mr. Worthington made an important contribution to highway-maintenance literature when he compiled and had published a monumental well illustrated volume covering practical maintenance operations now in use. This book is the latest and probably the most definitive work of its kind.

A native of Maryland, Mr. Worthington received his engineering education at Johns Hopkins University, Baltimore, and at the A.E.F. University in Beaune, France. He served two years in World War I with the 23rd U. S. Engineers, fifteen months of which time was spent in France with the American Expeditionary Force. Prior to his work in West Virginia, he was inspector of construction and maintenance for the Maryland State Roads Commission, and also worked in the testing laboratory of the North Carolina State Highway and Public Works Commission.

Since taking his first position as inspector of construction with the West Virginia State Road Commission in

1922, Mr. Worthington has also held the positions of draftsman, chief of survey party, junior engineer, senior engineer, and district construction engineer. In 1933 he was appointed District Engineer for the Ninth District with headquarters at Lewisburg, which position he held until his appointment as State Maintenance Engineer in 1938. He brings to the commissionership a well rounded background of highway experience in a state where the mountainous terrain presents unusual problems.

The present appointment as Commissioner is for the remaining three years of the uncompleted four-year term of that office. Mr. Worthington has not yet named his successor as State Maintenance Engineer.

Grout Mixer-Ejector

A positive-mix machine having a shaft with a series of paddles which rotate within the mixing and ejecting drum, the Union grout mixer and ejector is described in a new bulletin. Gen-

erally used in tunnel work for filling and sealing crevices, voids, and behind liner plates, the machine is adaptable to many other construction tasks, including railroad roadbed stabilization. The mixer-ejector will handle other semi-fluid mixtures besides grout.

Readers of this magazine can procure copies of the bulletin, No. 195, by writing the Union Iron Works, Inc., Elizabeth B, N. J. Just mention this notice.

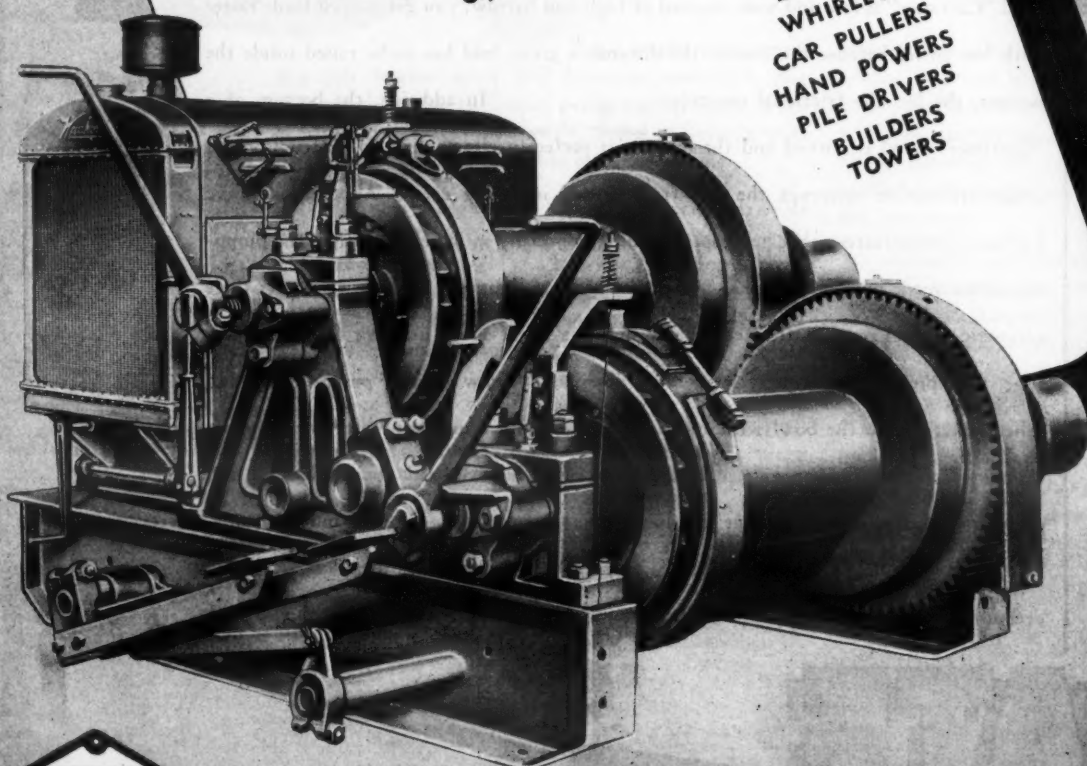
TOP PERFORMANCE with Clyde Gasoline Hoists

There is no substitute for performance in a hoist . . . performance that keeps materials and supplies moving week after week; month after month without delay.

Clyde Gasoline Hoists mean top performance . . . a reputation established by thousands of job tested machines. Clyde hoists are scientifically engineered and carefully constructed to give you the most dollar-for-dollar value. Excessive weight has been eliminated with no sacrifice of strength . . . their practical design provides economy, efficiency and ease of operation.

Put a Clyde to work on your next job. Write for special, informative bulletins on any Clyde Quality Product:—

HOISTS
DERRICKS
WHIRLEYS
CAR PULLERS
PILE DRIVERS
BUILDERS
TOWERS



CLYDE IRON WORKS, Inc.

Duluth 1, Minnesota

COATED STOODY MANGANESE

**Avoids Brittle
Weld Deposits**

and brings you
improved welding
qualities

Manufacturing manganese electrodes by usual methods presents complications. Too little manganese may cause brittleness of deposits . . . too much makes drawing impossible. **STOODY** neatly solves the problem with an improved method of manufacture. Alloying elements are tightly rolled in mild steel tubes. Percentage of manganese can thus be raised to allow for burn-out loss with an ample margin of safety to assure maximum toughness and wear resistance in welded deposits. Drawing limitations are thus completely sidestepped!

Coated Stoody Manganese

gives you fast burn-off rate, low spatter loss, low penetration and high build-up. It can be applied with either AC or DC machines and slag is easily removed immediately after welding.

Try this improved manganese electrode on your next build-up of 30 lbs. costs 40¢ per lb. in 3/16" or 1/4" rod sizes f.o.b. Whittier or distributor's warehouse. Discounts on quantity orders.

For maximum life and wear resistance hard-face all built up parts with **STOODY SELF-HARDENING!** Literature on request.

STOODY COMPANY

1136, W. SLAUSON, WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS

Retard Wear Save Repair

STEAM LOCOMOTIVE CRANES

Bought, Sold, Rented, Rebuilt

Eleven Locomotive Cranes, 50-foot booms, 15 to 40-ton capacity—available for service and shipment.

WILLIAM J. HOWARD, Inc.

35 E. Wacker Drive
Chicago 1, Illinois
Phone: Central 9618

Battling Snow and Ice Six Months a Year

With an Annual Snowfall Of 47 to 160 Inches at Elevations Above 4,000 Feet, Effective Methods Win

WHERE a large portion of a highway maintenance division lies at an elevation of 4,000 feet above sea level, the engineers responsible for keeping the roads open and safe for traffic are assured an arduous battle with ice and snow for about half the year. This is exactly the situation of Division 4 of the Oregon State Highway Department where William E. Chandler, Division Engineer with headquarters at Bend, is responsible for 1,768 miles of highway including four summits over the Cascade Mountains at elevations above 4,800 feet. In contrast, elevations are as low as 100 feet above sea level on the Columbia River, where wet snows and icy pavements are frequent.

The annual snowfall in the division usually requires plowing from early in November to the last of March and occasionally in October and April, and ranges from 47 to 160 inches. Both the depth and the accompanying temperatures vary greatly, not only from winter to winter, but at the same time within only a few miles. One particularly difficult summit over which traffic must be maintained is on the Santiam Highway, or U. S. 20 (in Oregon, highways carry names as well as numbers). At this summit some enterprising early promoter, feeling that the railroad would eventually build through that pass, constructed 2 miles of railroad in 1858, using Chinese hand labor, so that he could hold the pass and sell his "railroad without termini" for a worthwhile profit. The railroad never came that way but the highway did, and, according to Division Engineer Chandler whose responsibility it is to see that the traffic gets through, the railroad that didn't come is very fortunate.

Organization

Snow-fighting operations in Division 4 are handled in the same manner as general maintenance under four District Superintendents: C. C. Seeley at The Dalles, Forrest Cooper at Redmond, E. E. Johnston at Bend, and Tom Edwards at Klamath Falls. Under each District Superintendent are 8 to 10 section crews, consisting of from 4 to 10 men, responsible for snow removal on from 30 to 100 miles of state highway. At the summits of the higher passes where snow removal is difficult and critical, living quarters are provided for crews as large as 33 men, most of whom are competent operators of the snow-plowing equipment at the station.

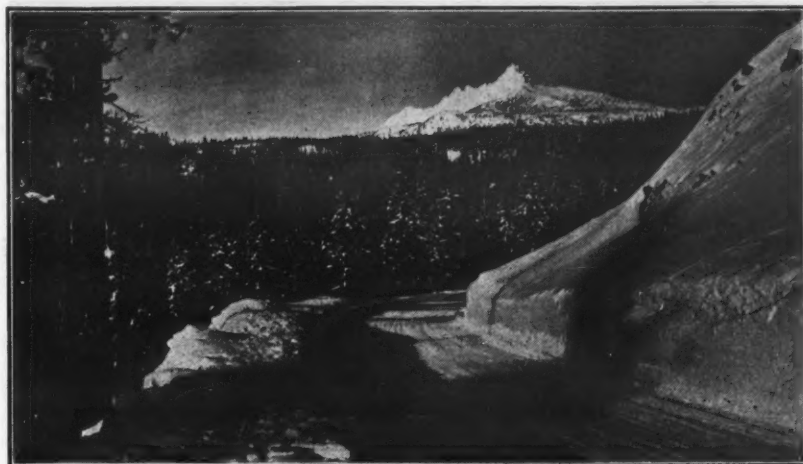
Light snow-plowing units used in the division include fifty-three 1½-ton trucks equipped with one-way plows, and twenty-seven ¾-ton trucks also so equipped. All one-way plows have reversible moldboards. In addition to these light units which are usually stationed at the headquarters of the section foreman and seldom get out of that immediate section, there are available in this division, for movement to critical points as needed, five 5 to 7-ton Oshkosh trucks equipped with V-plows, and six Snogos. There are also an equal number of 12-foot one-way blades which are quickly interchangeable with the V-plows on the heavy trucks. The Division Engineer feels that these heavy units are his mainstay in the battle against the snow.

There is sufficient storage at advantageous points throughout each district for all the equipment which may be available at one time. Two of the stalls at each storage shed are heated

and insulated and are utilized for making minor repairs. Warm storage is advantageous not only for repairs, but also allows the equipment to be easily started, and instantly available in an emergency. It is expected that the construction of warm storage stalls for all equipment will be an early post-war project. Facilities for major repairs are not available at the district shops, but these operations are performed in the State Shops at Salem and Klamath Falls during the off season.

Operations

The difficulties of snow-removal operations in this division are reduced somewhat by the fact that snow storms are generally not accompanied by high winds. Cuts having slopes as flat as 4



To keep mountain passes in Oregon open for traffic during the winter months requires careful planning and organization and heavy equipment.

to 1 seem to be nearly self-cleaning, and it is anticipated that eventually no cuts with a steeper slope than that will be constructed. Since the light wind which

usually accompanies the snow is from the south, the east and west roads ordinarily give the most trouble. Tem-

(Concluded on next page)

ATKINS "SILVER STEEL" SAWS

to Keep Up With the Pace of New Building

Young but famous number of the Atkins line of "Silver Steel" Hand Saws is the No. 2000 Saw... Rugged, keen to cut and keep cutting.

With the tempo of new construction bound to step up to new highs, you'll want to equip your men with saws that will help you keep up with the new pace. The name to remember then is Atkins "Silver Steel." It's the name that stands for the best in saws — in these practical ways:

Fast cutting, even on tough jobs, because Atkins saws have the design, the balance, the easy handling qualities that take much of the hard work out of sawing.

Keen, tough teeth, that continue to cut fast and easy for surprisingly long periods, with a minimum of filing.

Have these and many other advantages by saying "Atkins Silver Steel" whenever you buy saws.

E. C. ATKINS AND COMPANY
402 S. Illinois St., Indianapolis 9, Indiana
Agents and Dealers in All Principal Cities the World Over

MANUFACTURERS OF BETTER SAWS FOR EVERY CUTTING JOB

Atkins Circular Saws

Atkins No. 37 Mitre Tooth Saw shown above is ideal on portable power saws or saw tables. One of a full line of Atkins "Silver Steel" Circular Saws.



Division 4 of the Oregon State Highway Department has six Snogos for use at various critical points in its battle against an annual snowfall of 47 to 160 inches.

Battling Snow and Ice Six Months a Year

(Continued from preceding page)

peratures accompanying the snow storms are usually above zero but are quite likely to drop to 25 below zero the following day.

Light plows go out as soon as the snow starts and are kept in continuous operation, with a 12-hour limit per driver, for the duration of the snowfall, which is frequently two to three days. If the light plows prove inadequate to cope with the snowfall, heavier plows are added as needed. The light plows operate at a speed of 20 miles per hour, always in the direction of traffic. They are operated singly with a spacing of not less than $\frac{1}{2}$ mile between them. It is customary to have two men on each truck at all times but during the wartime scarcity of labor this was impossible. Since the larger plows are capable of doing more work with less expenditure of critical man-power, they have been used more extensively.

These heavier plows are operated at a speed of 25 to 30 miles an hour and go continuously through a section from end to end on one side of the road, then reverse and return. By the use of adjustable steel shoes, 4 x 6 inches in size and turned up at each end, under both ends of the blade, plowing can be done within an inch of the road surface without damage to the bituminous pave-

ment. It has been found that plowing this close to the road permits thawing of the snow left in place.

Division Engineer Chandler feels that plow blades having a uniform height

handle the wet and sticky snow which usually falls in the area more effectively than do the so-called high-speed plows with tapered blades. Since light and dry snow occasionally occurs, however, it has been advantageous to place protection above even the straight blade to keep the snow out of the driver's face. In some cases this has been done by the installation of a wood frame above the blade by the section foreman. The State of Oregon owns and operates snow plows of all manufacturers but prefers those made to the State's design on competitive bids.

Ice Control

In most parts of Division 4, light and dry pumice is available, so this material is used for sanding at critical points. Since it is extremely dry, no frost protection is needed and no calcium chloride is mixed with it. It is ordinarily applied by spreaders of state design, chain-driven from their own wheels and pulled behind a truck. When conditions of time and temperature require,

calcium-chloride crystals are sometimes spread on the coating of ice over the road at the rate of 0.10 pound per square yard per application.

Personnel

R. H. Baldock is Chief Engineer, Oregon State Highway Department, with E. A. Collier as State Maintenance Engineer. William E. Chandler is Division Engineer, Division 4, with headquarters at Bend in west-central Oregon.

Auld Given Jaeger Post

The appointment of E. C. Auld as Manager for its Air Compressor Division in southern California and Arizona has been announced by the Jaeger Machine Co., Columbus, Ohio. Mr. Auld's headquarters will be the Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles 54. This firm distributes the Jaeger line of construction equipment in southern California, Arizona, and southern Nevada.

CRACK CONTROL IN CONCRETE PAVEMENT

IT MUST be recognized that any crack in a pavement slab creates a fundamental weakness and a threat to pavement life. Even costly maintenance can only alleviate but not cure the disintegration of pavement where cracks destroy the continuity of concrete. The structural value of concrete, the road builders' best pavement material, is lost where its continuity is interrupted.

The behavior of concrete pavements assures that cracks will occur, but the engineer, with the knowledge of the conditional factors, can predict the intervals.

The conventional methods employed, to control cracking by a deliberately created weakened plane at spacing dictated by concrete behavior have, in themselves, given very inadequate results. It is not enough to control a crack at the pavement surface. It is also necessary to recreate conditions of uniform continuity of the structural values of concrete.

The attempt at crack control by forming or cutting a groove or ribbon at the surface of the pavement, and inducing the slab to crack to this control, had for its objective the transference of load by roughness interlock of concrete. Only a very small amount of contraction was needed to immediately destroy any possibilities of load transfer, and the attendant grinding of rough concrete surfaces filled interstices with a fine incompressible material and the effect of which condemned pavements to failure. The introduction of dowel bars had some bolstering effect, but created other problems.

Crack control is a must in pavement design. A deliberately made crack must employ a device that will recreate the conditions of concrete continuity and thereby preserve its structural qualities. The bearing surfaces of load transfer must be continuous and serve their function regardless of direction of traffic. The method of load transfer must not create any resistance to the forces of warping.

The Keycode Contraction Joint is designed to fulfill the objectives of crack control and load transfer. It is a simple, inexpensive plate of 20 gauge steel that molds the abutting slab ends into smooth, alternating six-inch interlocking pockets. The Keycode Contraction joint provides bearing of concrete on concrete for the entire width of the pavement.

The Keycode Contraction Joint can have no resistance to warping in any direction, a feature emphasizing its function to recreate the conditions of uninterrupted concrete continuity.

TRANSLUDE EXPANSION JOINTS—KEYCODE CONTRACTION JOINTS
LONGITUDINAL CENTER STRIP

HIGHWAY STEEL PRODUCTS COMPANY, CHICAGO HEIGHTS, ILL.

Shunk
Superior Quality
BLADES
AND CUTTING EDGES

For any make of machine
Motor Graders, Main-
tenance, Scrapers, Drags,
Bulldozers, Backfillers,
Wagon Scrapers, Trail
Builders, Trail Blasters,
Corrallies, etc.

CUTTING EDGES
WEARING SHOES
BACK SLOPERS
EXTENSION BLADES
MOLDBOARDS
and
SCARIFIER TEETH

50 years of manufactur-
ing blades has developed
for you a special steel,
milled through our own
rolls and forged at the
edges to give that extra
wearing quality you need.

All widths, lengths, and
thicknesses. **SHUNKED**
ready to fit your machine.

Consult your internation-
ally recognized Blade Spe-
cialists. Write for special
bulletins, giving type and
name of machine you
operate—get set for blades
today.

Shunk
MANUFACTURING
COMPANY
Established 1854
BUCYRUS, OHIO



The new Tournatruck is specially designed for off-the-road hauling jobs.

Off-the-Road Hauling With Big-Tired Unit

Developed to meet the need for an off-the-road heavy-duty truck, the new LeTourneau Tournatruck is basically a flat-bed trailer drawn by a two-wheel Tournapull. Large, broad, low-pressure tires make the equipment adaptable to all off-the-road conditions, and variations in size and power of the drive unit and in the size of the trailer bed provide different combinations to meet the varying needs of the Tournapull-Tournatruck user.

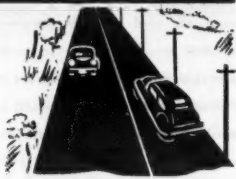
Combined with the Tournapull, the Tournatruck gives the advantages of a low center of gravity, pivot-turning maneuverability, a 14.9-mph speed, big capacity, and both on-the-road and off operation. The two-wheel Tournatruck has a big keel to which is welded box beams. A floor of heavy oak plank is set atop the steel bed, and the load rides down between the wheels, since the need for springs is eliminated by the special tires.

Tournatruck folder TT-100 may be secured from the manufacturer, R. G. LeTourneau, Inc., Peoria, Ill. Just mention this news item.

Continental Folder Aids Construction-Hose Users

Users of hose on construction jobs will find helpful a copy of the Vitalic Contractors' Hose Folder issued by the Continental Rubber Works, Erie, Pa. A variety of contractors' hose for use with water, air, steam, suction, or for jetting is illustrated.

cut down road glare
reduce hazards



CONCRETE pavement is safer, easier to drive on when Emulsified Black is used to produce soft tones of grey or black. Not only is glare greatly reduced, but white markers stand out more strongly, reducing traffic hazards. Emulsified Black also hides unsightly oil stains.

Emulsified Black complies with State specifications. A colloidal dispersion of not less than 25% carbon black, it flows freely, working immediately into the mix. Emulsified Black requires no pre-mixing, and is easy and clean to handle. For further information, write to . . .

Carbon Dispersions, Inc.

27 HAYNES AVE.,
Newark 5, N. J.
Tel.: Bigelow 3-4511



tion. Also included are the Vitalic 109 road hose for rough going on general contracting work; Vitalic 276 jet hose for high-pressure work on dredges, pile-driver rigs, etc.; and various other Vitalic hose specifically made for contracting work where strength, durability, and tough construction are essential requirements.

Rubberized and oiled clothing, hats, aprons, gloves, boots, sheet packing, and pump diaphragms, all designed for the contracting field, also are shown.

Copies of the Vitalic Contractors' Hose Folder will be furnished by the company upon request. Just mention this publication.

Dual Batcher Speeds Aggregate Discharge

Dual batching of aggregates is provided for in a new development for road builders announced by the C. S. Johnson Co. The aggregate bin is of the portable-section type, of 100-cubic-

yard capacity, divided into three compartments, with hinged leg sections for fast erection and moving.

Two multiple material batchers having 34-E paver-batch capacity are so located that a single operator can handle both units. The batchers are discharged simultaneously into the separate compartments of 2-batch trucks, thus necessitating only one spot at the aggregate plant. This effects a saving in man-power and time, and a reduction in the number of hauling units, due to the reduced standing time at the plant, the manufacturer states.

Dual cement batchers are provided for in Johnson bulk cement plants, including the Dutch Mill, the Portable Section, and the Twin Silo units, further to increase batching efficiency. The Twin Silo, developed to provide storage capacity up to 1,610 barrels of cement, is the largest portable unit in the Johnson line.

Full details on Johnson batching plants may be obtained by writing the C. S. Johnson Co., Champaign, Ill.



Stanolube HD

Stands up in tough break-in service

Here's the story of a heavy duty gasoline engine and Diesel oil that was adopted for break-in service by a Diesel engine manufacturer. Its ability to resist heat, prevent scoring and eliminate engine deposits on the tough break-in job described at the right is a clear indication of how Stanolube HD will reduce maintenance trouble and expense in any truck or stationary gasoline or Diesel engine service.

A Standard Oil Engineer will help you test Stanolube HD in your equipment. See the difference in your own cost records. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for Engineer nearest you.

Eight 165 HP Diesels are run-in at one time on the test line pictured above. Before using Stanolube HD, the practice was to tear down each engine to inspect bearings and pistons at the end of the break-in period. Since adopting Stanolube HD, engine parts are so uniformly clean and free from scuffing that only one out of every 25 engines is disassembled for inspection.

A 1500 gallon oil circulating system supplies Stanolube HD to the engines for two hours of the break-in run. For the balance of the period, the engines are lubricated through the normal engine lubricating system. All oil is returned to the circulating system at the end of the run. Make-up oil is unusually low and one fill of oil has operated two years. A 150 gallon filter system removes contaminants from the oil.

STANDARD OIL COMPANY (INDIANA)

STANDARD
SERVICE

Better Trucks for YOUR Business!

TRUCK-ENGINEERED • TRUCK-BUILT • BY TRUCK MEN



"Our 20 Ford Units Stay on the Job"

It doesn't take long for the profit on a job to vanish, if truck equipment can't stand the pace. That's why the rugged reliability and endurance of Ford Heavy Duty Trucks have made them such favorites in the construction field as well as on street and highway work.

Contractor C. W. Shirey, of Waterloo, Iowa, is strong for Ford Trucks. He wrote recently:

"The splendid way we've been able to maintain our Ford units, handling ready-mix concrete deliveries, for the last ten

years, has been very gratifying. Eleven of our twenty Ford units carry mixer equipment, and they've been going every day, long hours—especially all through the war period. Through the service given by our Ford dealer, we've kept them running, and kept tie-ups to a minimum. Rest assured we'll continue to use Ford units."

The new Ford Trucks are better than ever—engineered for more economy, more reliability, longer life. There's a new Ford Heavy Duty Dump Truck chassis that's a stand-out value. Ask your Ford Dealer about it!

FORD TRUCKS

MORE FORD TRUCKS ON THE ROAD • ON MORE JOBS • FOR MORE GOOD REASONS

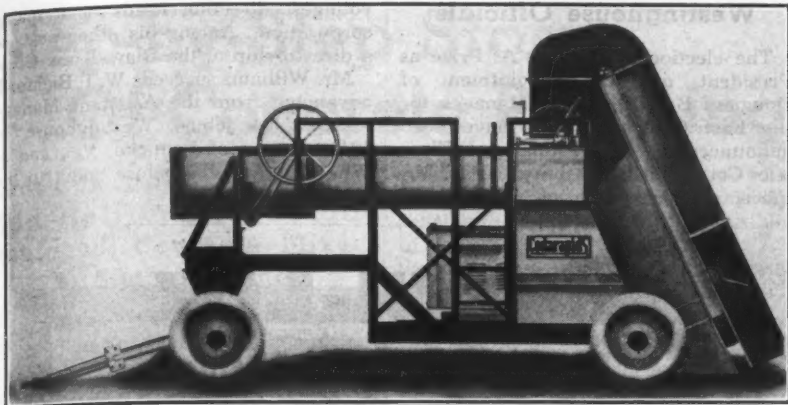


ADVANCED ENGINEERING IN NEW FORD TRUCKS

More Economy and Endurance
Easier Servicing

A STILL GREATER 100 HP V-8 ENGINE with NEW Ford steel-cored Silvalloy rod bearings, more enduring than ever in severe service • NEW aluminum alloy cam-ground 4-ring pistons for oil economy • BIGGER, more efficient oil pump and IMPROVED rear bearing oil seal • NEW longer-lived valve springs • NEW improvements in cooling • NEW efficiency in ignition • in carburetion • in lubrication • in ease and economy of servicing operations • And available in all truck chassis except C.O.E. units—the rugged, thrifty 90 HP FORD SIX-CYLINDER ENGINE, with many important advancements.

FORD CHASSIS ADVANTAGES: Easy accessibility for low-cost maintenance • Universal service facilities • Tough, forged front axles • Extra-sturdy rear axles with pinion straddle-mounted on 3 large roller bearings, $\frac{3}{4}$ -floating type in light duty units, full-floating in all others • 3 axle ratios available (2 in 1-ton unit) • 2-speed axle available in heavy duty units at extra cost • Powerful hydraulic brakes, large drums, cast braking surfaces • Rugged 4-speed transmission with NEW internal reverse lock optional at extra cost on light duty units, standard on all others.



The Patchmaster, with a capacity of 25-30 tons an hour, is one of the new portable mixing plants recently announced by Iowa Mfg. Co.

Portable Mix Plants In Two New Models

Two new portable asphalt-mixing plants, the Model F and the Patchmaster, have been announced as additions to the Cedarapids line. Model F, of the batch type for big projects, has a 2,500-pound capacity, while the Patchmaster, of the continuous-mix type, is designed for smaller jobs.

Highly compact and portable, the Model F requires only to have its telescoping elevator raised in order to begin work. Aggregate is dumped into a hopper and elevated to a 3 x 10-foot triple-deck horizontal vibrating screen which grades it into a 4-compartment (6-batch) hopper. The material then passes to a 25-cubic-foot batcher, from which it is carried in correct proportions by a patented skip to the 25-cubic-foot pugmill for mixing prior to dumping directly into waiting trucks. Operation of the Model F centers in a ground-level control platform. The plant, which can be used for hot or cold mixes, with or without drier, is mounted on pneumatic tires for trailer or semi-trailer hook-up.

An accurate mix, at the rate of 25-30 tons an hour, is said to be possible with the Patchmaster, designed for less extensive operations than the other Cedarapids units. It has a single-shaft 16-inch x 10-foot pugmill, and an enclosed chain-type bucket elevator. Its rotary asphalt pump and apron feeder are synchronized with the pugmill for fast adjustment so as to meet exact specifications. Running gear and drier are optional equipment.

Full details on these new Cedarapids plants may be secured by writing to the Iowa Mfg. Co., Cedar Rapids, Iowa.

Streamline the Canal To Forestall Atom Bomb

The streamlining of the Panama Canal as a precaution against potential atomic bombardment was urged in a paper read at the 93rd Annual Meeting of the American Society of Civil Engineers in New York City in January. The suggestion was voiced by John G. Claybourn, Superintendent of the Canal's Dredging Division.

Such streamlining is no modern concept. It would be achieved by turning the clock back 40 years so as to convert the present canal into the lock-less dam-less sea-level cut recommended by the majority of engineers

fense needs of the day dictated that the majority report be disregarded when the Canal was built, but today's needs make streamlining a "must", the speaker said. Atom bombing reduces above-ground edifices, but is virtually ineffective on subsurface installations, he pointed out. To construct the necessary 500-foot-wide sea-level channel would require about 12 years and an expenditure of \$1,310,400,000, comparable to the cost of about 5 1/4 days of the recent war, Mr. Claybourn said.

The war interrupted construction of a third set of locks on the Canal. The proposed sea-level channel would have no locks or dams other than the readily repairable under-water tidal locks, he revealed, claiming that conversion to the new type of channel could be accomplished most economically by working simultaneously with the third locks project when it is resumed, to insure continuous traffic during conversion.

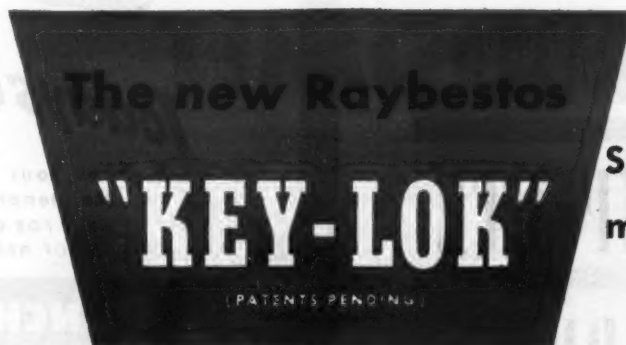
Only half the channel would be excavated an additional 30 feet of depth at a time. When the work was com-

pleted, the channel would be 500 feet wide and have an average depth of 55 feet, Mr. Claybourn said. He cited the Suez Canal as an invulnerable, indestructible route, superior to the Isthmus crossing.

Mr. Claybourn has been associated with the Canal since 1910. In 1945 he was presented the Balboa award by the Panamanian Government.

Heads Dealer Firm

The election of Robert T. Harris as President of the Matt A. Doetsch Machinery Co., Washington, D.C., distributor, was announced recently. Mr. Harris was formerly Vice President of the Blaw-Knox Division of the Blaw-Knox Co., in which post he supervised the firm's construction equipment department. The Washington concern represents Blaw-Knox in the sale of construction machinery in that territory, and has added Blaw-Knox heavy steel concrete forms and standard steel buildings to its line.



Slide-on brake block for big jobs
makes replacement quick, simple

■ Now you can replace brake blocks on the big jobs with a simple turn-of-the-wrench!

Down-time for relining is cut to the minimum. Just "slide off the old and slip on the new"—with Raybestos "Key-Lok" block. You'll save hours . . . because you don't have to remove troublesome bolts, bands or shoes. You're back on the job in a fraction of the time—and you get the best brake service you've ever had!

Save time, labor, money . . . get better braking . . . with "Key-Lok." It's available for all your heavy equipment; it's precision-made for each application. See your Raybestos jobber or write us for prices and details.

There's much more to Raybestos "Key-Lok" than the time you save. Here are other advantages:

1. It has up to 6 1/2% more friction surface.
2. No squeak can be caused by loose blocks.
3. Unbroken surface—no bother with plugs.
4. No holes to collect foreign abrasive material.
5. Brakes relined by simply sliding blocks over shoes.
6. Keepers hold blocks to shoe with up to 7 times greater holding power than with bolts.

Raybestos "Key-Lok" means lower cost of brake block maintenance as well as installation.

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., BRIDGEPORT, CONNECTICUT



Raybestos
INDUSTRIAL
FRICTION MATERIALS

PRECISION AIRCRAFT ENGINE PARTS—
COMMERCIAL HEAT TREATING—SEASON-
ING OF STEEL—NITRIDING—A SPECIALTY

CADMIUM, ZINC, TIN and
HARDCHROME PLATING

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Sales Offices: 1402 Kales Bldg. Detroit 26, Mich.

Peru Plans Five-Year Road-Building Program

Peru has embarked on a five-year highway-building program that will involve an expenditure of over \$50,000,000, two officials of that South American nation's Highway Department revealed recently on their arrival in this country. At least 20 per cent of this amount, about \$10,000,000, is to go for U. S. equipment and machinery.

The visitors, guests of the Office of Inter-American Affairs, are Eduardo A. Salgado, Assistant Director of the Peruvian Highway Department, and Juan Quirago, the Department's Chief Designing Engineer. They expect to spend three months in the United States, visiting road-building machinery plants and studying our methods of highway construction. The American Road Builders' Association and the Public Roads Administration are cooperating in their tour.

The Latin American republic had less than 1,250 miles of usable highway 20

years ago. Today it has nearly 20,000 miles and the five-year program is expected to extend the system considerably. The Peruvian section of the Pan American Highway has been completed, and more than half the 1,835-mile stretch has already been asphalted, the visitors reported. They added that the route across Colombia from Venezuela to Ecuador has also been completed.

Dealer Organization Of LeTourneau Complete

Announcing the completion of a peacetime sales and distribution organization, G. S. McKenty, General Sales Manager of R. G. LeTourneau, Inc., Peoria, Ill., reveals that 57 exclusive dealers now comprise the domestic sales organization in the U. S. and Canada. The firm has representation in 92 cities.

Each distributor has been shown the graphic presentation, "The LeTourneau Story" and intensive courses have been given to 417 dealer employees at factory training schools.

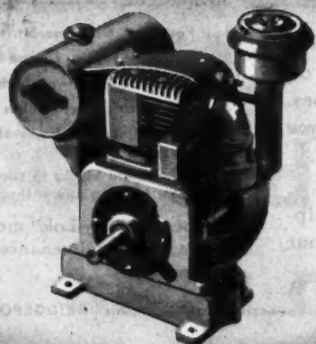
Westinghouse Officials

The election of Gwilym A. Price as President, and the appointment of Douglass B. Williams as Manager for the East Central District have been announced by the Westinghouse Electric Corp., East Pittsburgh, Pa. Mr. Price, at 50, is one of the nation's

youngest directing heads of a major corporation. Among his other posts is a directorship of the Blaw-Knox Co.

Mr. Williams succeeds W. I. Bickford, advancing from the Assistant Managership. He joined Westinghouse in 1941, serving at Roanoke, Va., and at Wheeling, W. Va., before going to the Pittsburgh office.

ONLY BRIGGS & STRATTON OFFERS THIS COMPLETE WIDE-SPREAD SERVICE



ALL over the United States and Canada, and in many other countries, you will find Briggs & Stratton Authorized Service Stations. Operating under factory policies and procedures, they are again becoming fully equipped to take care of any emergency—to adjust, repair, or rebuild any model of Briggs & Stratton engines, even though it is a veteran of ten or twenty years of service. This authorized service is maintained to protect your investment in Briggs & Stratton engines. It is an important added advantage, recognized alike by manufacturers, dealers, and users of appliances, farm machinery and industrial equipment.

BRIGGS & STRATTON CORP., MILWAUKEE 1, WIS., U.S.A.

Air-Cooled Power



PUNCH-LOK

Hose Clamps and Fittings

LOOK, it's locked for safety



Today's Best Bet!

For Your Production and Maintenance Operations—
WRITE FOR CATALOG AND NAME
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IT'S SELF-CONTAINED

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Gasoline Hammer

**PAVING
BREAKERS**

Bust concrete

Cut asphalt

Dig clay and shale

Tamp backfill

Easier — Faster — Cheaper

Write for catalog folder

SYNTRON CO.

227 Lexington, Homer City, Pa.



NO COMPRESSOR
HOSE
BATTERY BOX
CABLE
SPRINGS
That's SYNTRON

Step-by-Step Story Of Concrete Patching

**Sections up to 248 Feet
And Half or Full Width
Replaced; Concrete Mixed
At Site of Patches**

LYONS & Breedon, contractor of Rogersville, Tenn., recently completed a contract with the Kentucky Department of Highways for patching concrete pavements on various highways in Whitley, Knox, and Laurel Counties in the southeastern part of the state. The hub of this improvement, which extended over 21 miles of road built 10 years ago, was the town of Corbin, with patching done on U. S. 25 leading northward to London, eastward on U. S. 25E to Barbourville, and southward on U. S. 25W to Williamsburg.

The patches, about forty in number and practically all on fill sections, varied from 4 to 248 feet in length, and included either half or full width of pavement, with the latter type of patch predominating. The 9-6-9-inch slab sections of the 20-foot concrete pavement which were scaling and cracking were replaced with plain concrete, 9 inches thick, mixed at the site of each patch.

Removing Old Concrete

The sections to be removed were first outlined on the pavement with yellow paint by the engineer, and holes were drilled through the slab on 6-inch centers at each end of the patch by an Ingersoll-Rand and a Thor air hammer using 1-inch drill steel and powered by a Smith 90-cfm portable air compressor. At mid depth of the slab and 4 inches from the edge was a 3/4-inch reinforcing rod which ran the length of the pavement. The jackhammers cleared a space around this rod so that it could be burned off with a torch, thereby preventing any shock being transmitted to the adjoining pavement from the operation of the pavement breaker which followed.

This pavement breaker consisted of two sections of steel channel 12 feet high acting as leads for a 1,500-pound steel drop hammer mounted at the rear of a 16-foot flat-bed 1 1/2-ton Ford truck. The hammer was operated by a single-drum Domestic hoist driven by a Le Roi 4-cylinder gas engine and had a maximum drop of 7 feet. The breaker shattered the concrete by working along the length of the patch, starting at the edge and breaking a strip from 12 to 18 inches wide. When this narrow strip was sufficiently broken up, the unit worked on the adjoining concrete, doing a lane of about the same width, and so on until the center joint was reached. Five or six trips were made across a 9-foot half width of pavement, at the end of which the concrete was broken into pieces small enough so that they could be removed by hand. The hammer also did a very good job of compacting the sub-base beneath the pavement, with a settlement of from 1 to 2 inches being noted.

Additional work with the oxy-acetylene torch was required along the center joint where 5/8-inch tie rods at 5-foot intervals connecting the two lanes had to be removed, along with the metal longitudinal center-line joint. Enough concrete was removed on the other half of the pavement to allow room for setting a steel form along the center line. The old concrete was removed by hand, loaded into a 1 1/2-ton truck, and dumped along the road at locations designated by the Division of Maintenance engineers of the Highway Department.

A four-man crew then moved in to prepare the subgrade and set forms. Channels were dug through the shoul-

ders at frequent intervals to insure adequate drainage to the ditches, thereby keeping the subgrade as dry as possible. In some locations the foundation for the new paving was brought up to grade with a good quality of clay dirt which was consolidated carefully by hand tampers. Two rows, 9 feet apart, of 9-inch Blaw-Knox steel road forms were then set and oiled with a light grade of floor oil from a hand sprayer. On full-width patches, the construction was done one-half width at a time, in order to maintain traffic.

Supply of Materials

As the mixing of the concrete took place adjacent to the area being patched, the materials used in the pour were transported in the necessary quantities



C. & E. M. Photo

Lyons & Breedon, contractor for concrete patching on 21 miles of highways in Kentucky, set up a mixing plant by the side of the road being repaired. Aggregates were weighed by Johnson Bantam batchers and delivered by wheelbarrows to the Jaeger 2-bag mixer. Lehigh high-early-strength cement was used in the mix.

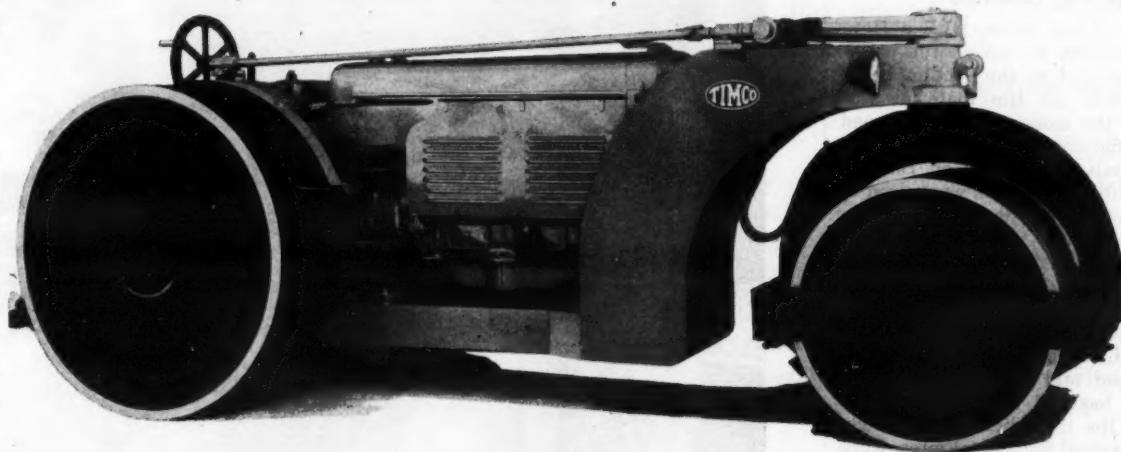
to the individual patch while the equipment was moved about to follow the work. Sand from the Ohio River was purchased from the Louisville San-Gravil Co., and shipped 190 miles from Louisville via the L & N railroad to a siding at Williamsburg where it was unloaded by hand from the gondola car into three 1 1/2-ton trucks, two Fords

and one International, which hauled the sand to the road where it was stockpiled on the pavement.

The Kentucky Stone Co. of Mount Vernon, Ky., supplied the stone, and shipped it 50 miles over the L & N railroad to Corbin, where it was unloaded by a conveyor belt into a 2 1/2-yard

(Continued on next page)

TIMCO ... A New Name FOR AN OLD FRIEND



The ruggedness and dependability of J. E. Ingram Equipment Co. road rollers have made them popular with contractors everywhere. The Timco Manufacturing Co. is a division of J. E. Ingram Equipment Co. (Inc.). Nothing else has been changed. Our policy will be to continue to give the trade the finest equipment that can be made.

New ideas in design are engineered into TIMCO rollers to give greater compaction, longer life and lower maintenance costs.

VARIABLE WEIGHT - 3-WHEEL ROLLERS

Hollow, cast wheels to which water or sand ballast may be added to increase ground pressure. Three models . . . 6-8, 8-10 and 10-12 ton.

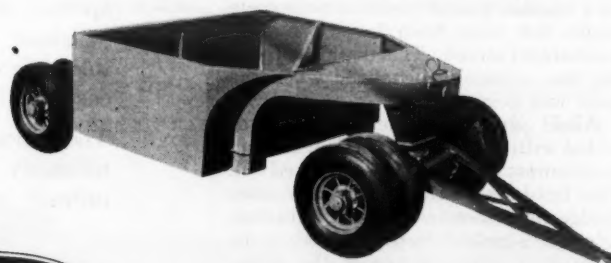
TIMCO SHEEPSFOOT ROLLERS

Here's a rugged roller that does a thorough job of compacting earth fill and that does not ball-up with mud.

TIMCO PNEUMATIC TIRED ROLLERS

The Timco pneumatic tired roller was the first "LOW BOY" Oscillating-wheel roller ever built. The Timco offers unrestricted oscillation, which assures uniform compaction as the load is distributed evenly to all tires. Reduces number of tire blowouts and eliminates upsetting.

TANDEM ROLLERS OF THE
VARIABLE WEIGHT AND
TYPE, SIZES 5-7 TON AND
8-10 TON, WILL SOON BE
ADDED TO THIS POPULAR
TIMCO LINE.



MANUFACTURING COMPANY

Division of J. E. Ingram Equipment Co. (Inc.)

1146 W. Laurel Street P. O. Box 2340 San Antonio 6, Texas

Concrete Patching

(Continued from preceding page)

dump truck which made an average haul of 15 miles to the various locations where the stone was used. There it was dumped either on the shoulder or at the side of the road.

High-early-strength cement was bought from the Lehigh Portland Cement Co. at Mitchell, Ind., and shipped in bags over 300 miles on the L & N railroad to Williamsburg, where it was stored in a shack. It was trucked out to the job sites as it was needed, and stacked next to the mixer. Numerous creeks along the road solved the problem of water supply. The water was pumped by a 3-inch Jaeger into a 400-gallon tank mounted on a Chevrolet 1½-ton flat-bed truck, which hauled it to a cylindrical tank which was set up near the concrete mixer. This tank, 5 feet high and 3½ feet in diameter, held about 400 gallons, and was filled by pumping in the water from the tank truck with the Jaeger 3-inch pump mounted on the truck. A similar pump with a reducer transferred the water from the storage tank to the mixer through a 1-inch rubber hose.

Mixing Concrete

A Jaeger 2-bag mixer with a Hercules engine was set up on the pavement at one end of the section being patched, while all the material was stocked on the same side of the road so that traffic could be maintained on the other half. Two Johnson Bantam batchers with beam scales were used to weigh the sand and stone which were loaded by hand into wheelbarrows, and after being weighed were dumped into the mixer skip. Three wheelbarrows were used for moving the aggregate the short distance from the stockpiles to the mixer. Each batch took two wheelbarrows of sand and three of stone for every two bags of cement. The dry weights of the ingredients in a batch, which was mixed for 1½ minutes, were as follows:

Cement	188 lbs.
Sand	411 lbs.
Stone	670 lbs.
Water	96 lbs.
Total	1,365 lbs.

The sand and stone met the following gradation requirements:

Sand		Stone	
Sieve Size	Per Cent Passing	Sieve Size	Per Cent Passing
¾-inch	100	2½-inch	100
No. 4	85-100	2-inch	90-100
No. 16	40-80	1-inch	35-70
No. 50	2-30	¾-inch	10-30
No. 100	0-5	No. 4	0-5

When a batch was mixed, it was discharged into a Jaeger concrete buggy on two rubber-tired wheels which held a complete batch, and was then rolled down a wooden ramp from the pavement onto the subgrade by two men who dumped it between the forms. A Master adjustable vibratory screed, with a ¼-inch camber in its bar to correspond to the existing crown in the pavement, was then pulled over the concrete by two men, and was followed by a wooden screed in case any concrete might not have been leveled by the mechanical screed. This double screeding was especially beneficial when the pour was going uphill.

After screeding, the surface was tested with a long-handled float for any unevenness which was then worked out. Two finishers operating from a wooden bridge next inserted metal contraction joints, 2½ inches deep x ¾ inch wide, at 30-foot intervals across the pavement. A 1-foot-wide canvas belt was then dragged lengthwise along the pavement, after which the surface was broomed with a 16-inch wire broom. The finishers later removed the steel contraction joints and edged them with a tool having a ¼-inch radius. The joints were usually poured the next day

with asphalt heated to around 90 degrees F by a kerosene torch in a portable asphalt tank mounted on two rubber-tired wheels. The concrete was cured with Aquastatic membrane compounds, applied at the rate of 1 gallon to 200 square feet by a Hudson 3-gallon sprayer. The use of high-early-strength cement made it possible for traffic to ride over the patches after three days.

A total force of about 23 men was used on this patching contract, with a crew of 6 removing the concrete, including the truck driver and hoist operator who also operated the jackhammers and compressor on the paving breaker, and 4 laborers to load the broken chunks into the truck. The grading and form setting took 4 others, while the concrete crew numbered 13. Six of the concrete crew were employed in charging the mixer; another ran the mixer; 2 men pushed the loaded buggy and dumped it in the forms; the remaining 4 consisted of 2 finishers and 2 helpers who did the puddling, pulled the screeds, finished the concrete, and in-

stalled and poured the contraction joints.

Testing the Concrete

The concrete was tested by making and breaking beams and cylinders, the former in the field by the Resident Engineer and the latter in the Highway Department laboratory at Frankfort. The beams were 6 x 6 x 42 inches, and were broken on a Riehle beam breaker

to see if the concrete had developed the necessary 600-pound modulus-of-rupture strength so that the pavement could be opened for traffic in three days. The concrete cylinders, 6 inches in diameter x 12 inches long, were tested after 28 days and had to show a crushing strength of 3,500 pounds to the square inch.

The mix used was designed each day
(Concluded on next page)

HUMDINGER

WRITE FOR
NEW CATALOG No. 4503

DIAPHRAGM PUMPS

VALVES NEVER WEAR OUT

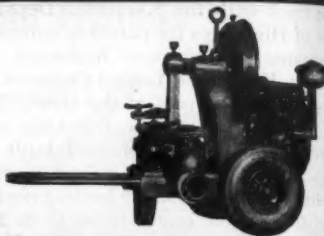
NO TROUGHS, NO SPLASH,

NO PUDDLES, NON-CLOGGING

SIZES: 3" SINGLE, 4" SINGLE, 4" DOUBLE

RALPH B. CARTER COMPANY

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Grinding splines of transmission shaft to .001 tolerances in the Oliver "Cletrac" Plant.

We're not tolerant of tolerances!

In fact, we're very exacting! For example, all splines of transmission shafts on Oliver "Cletrac" crawler tractors are ground to a tolerance of .001—insuring true running and easy shifting of gears.

These close tolerances—the precision fits so necessary for smooth, quiet operation—are a primary essential of every operation in the

Oliver "Cletrac" plant. And those tolerances are carefully checked by the most modern testing devices to guarantee the maintenance of the outstanding quality that characterizes every Oliver "Cletrac" tractor.

Materials, design and workmanship are all based on one standard—the built-in quality that assures years of dependable, economical service.

Maintenance of that standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors—for your every need.

CLETRAC

a product of



The OLIVER Corporation



The Sicard Snow-Blower consists of a specially designed and built truck, the blower assembly, and a Buda gasoline or diesel power unit to drive the blower. Equipped with a rotating chute, it will move snow from 5 up to 150 feet without the chute.

Rotary Plow Handles Difficult Snow, Ice

In use since 1922 in the winter maintenance of roads across Canada, the Sicard Snow-Blower has recently seen service in upper New York State which also has a deep-snow and ice problem. In a demonstration at the Watertown, N. Y., Airport, it is reported that this rotary plow removed snow piles along the 5,000-foot runway, throwing it over 150 feet without raising ridges along the sides, and that slush-based snow 1 foot deep which froze on being uncovered by preliminary plowing was removed at a 12-mph rate.

The Snow-Blower consists of three main parts: the truck, the blower assembly, and the power unit driving the blower. Snow or ice in front of the Snow-Blower is conveyed to a propeller by two spiral blades. The propeller blows it right or left from the turbine for a distance of 150 feet. Using a telescopic rotating loading chute, this distance can be limited to 5 to 25 feet, or the chute may be used for loading into trucks. The blower assembly is powered by a Buda engine, either gasoline or diesel, mounted at the rear of the special chassis. Ice scarifiers affixed to the hardened-steel front augers operating on waterproof bearings make possible the use of the unit in solidified snow. The spirals and the propeller are protected by shearing safety devices.

The truck on which the Snow-Blower is mounted is specially designed and built. The cab is directly over the truck's gasoline engine to shorten the distance between the blower and the front axle, with a resulting better distribution of weight, it is stated. Right-hand drive is used to permit the operator to see all obstacles easily. Special chassis construction, springs, and axle support, together with air brakes and a large-diameter steering wheel, are among the truck's other features.

More complete details, with specifications, may be obtained direct from Sicard Industries, Inc., 74 Peru St., Plattsburg, N. Y. Just mention this illustrated news item.

New Standard Ready On Electric Welding

Changes resulting from wartime experience are incorporated in a new set of standards for electric arc welding machines and electrodes which has been released by the National Electrical Manufacturers Association.

The new standards coordinate and simplify the method of rating welders without basically changing the size of the welder. Using the dc welders as a guide, it rates both dc and ac welders on the basis of the same duty cycles. The standards completely cover dc welders of both variable-voltage and constant-potential types, circuit-control equipment for the latter, and two types of ac transformer arc welders.

For the first time since NEMA initiated arc welder standards in 1936, standards are outlined for transformer

welders below 200 amperes. Test procedure for temperature, efficiency, and dielectric tests has been revised and brought up to date to correspond to the latest American standards. The electrode standards are revised and published in two parts, those covering

classifications, standard diameters, and package weights being included in the present publication. Complete definitions of terms referred to in the standards are also included in the booklet.

Copies of the new standard, Publication 45-105, may be obtained from the National Electrical Manufacturers Assn., 155 E. 44th St., New York 17, N. Y. Price: 75 cents.

Chemical Intensifier Waterproofs Concrete

A liquid chemical agent for waterproofing, quick-setting, hardening, bonding, dust-proofing, and intensifying portland-cement mixtures is being marketed by the Insuro Chemical Co. The product, Insuro Emulsion, has seen extensive application in New England. It is said to produce an improved concrete having early and permanent strength, and to permit pouring at temperatures as low as 16 degrees F.

Insuro, which is added to the mixing

water, is an integral liquid compound, the ingredients of which, in chemical combination with portland cement, are designed to accelerate and more completely hydrate the cement particles, producing a stronger and more dense concrete.

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Literature on this six-way liquid chemical emulsion can be obtained by interested readers of CONTRACTORS AND ENGINEERS MONTHLY on mention of this notice. Write the Insuro Chemical Co., 15 Union St., Lawrence, Mass., and ask for the bulletin on Insuro.

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Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute construction equipment will put your planning on a profitable basis. His name is listed on page 41. Blue Brutes include:

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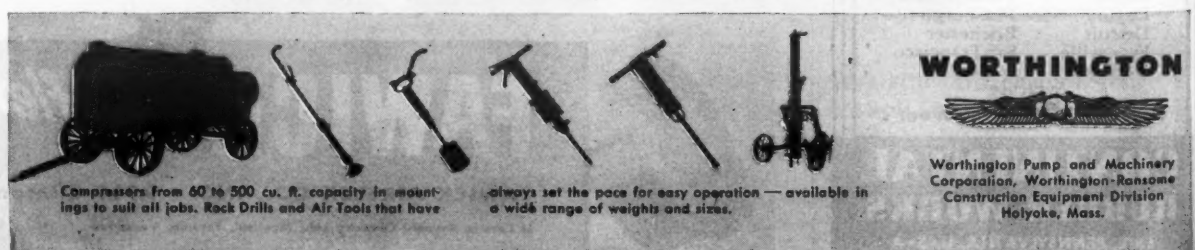
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always set the pace for easy operation—available in a wide range of weights and sizes.

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Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

Central Valley Plans; New Dam Recommended

New funds and the removal of wartime restrictions have permitted the Bureau of Reclamation to accelerate its program in California's Central Valley. A total of \$32,000,000 is now available since Congress passed a deficiency bill to cover costs until July 1. The irrigation features of the project, halted during the war, are to form the bulk of the 1946 work.

The 160-mile Friant-Kern and the 110-mile Delta-Mendota Canals are to be the major activities this year, together with the completion of the last 10 miles of the Contra Costa Canal and the construction of the Mountain View Reservoir to supply the city of Martinez. Finishing touches must also be applied to Shasta, Keswick, and Friant Dams, and a 230-kv transmission line must be built from Oroville to Sacramento. Costs of the power program for the second half of the year are estimated at \$6,771,000; irrigation features, \$24,761-

000; joint facilities, \$3,650,000. All work is to be done by contract with private firms.

The first 5.6-mile section of the Friant-Kern Canal is under contract to Peter Kiewit Sons' Co., and bids were opened recently for an additional 15 miles of this 4,000-second-foot canal. Bids will be called for in the near future for a siphon at Kings River and for building an additional 8½ miles of the canal, including two siphons. Bids are also to be asked on 13 miles of the Delta-Mendota Canal, and a wasteway on this project.

Trewhitt-Shields & Fisher expects to resume work soon on a 5.3-mile section of the Contra Costa Canal. Bids were called for last month on the remaining 4.7-mile section, which includes Mountain View Reservoir. Construction of a stilling basin for the outlet of Friant-Kern Canal at the Friant Dam will be let in April.

The Bureau of Reclamation has recommended the immediate construction of the Bidwell-Bar Dam, reservoir, and



On a highway widening job near Shirley, Ill., I. D. Linn Co. of Springfield, Ill., used Caterpillar diesels to haul scrapers for the cut and fill.

power plant on the middle fork of the Feather River, 8 miles east of Oroville. The work is part of a 15-year program outlined in the Central Valley Basin Report recently submitted to Washington for approval. The proposed dam, to be one of the system's highest, would be 679 feet above the streambed, 2,100

feet long, and have a storage capacity of 1,200,000 acre-feet of water, covering 5,800 acres. The reservoir and two power plants would cost about \$70,000,000, and a later distribution system \$2,000,000 more.

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See ad on page 40 for list of
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Bridges 50 Years Old Replaced by Railroad

Two-Mile RR Relocation Includes Two Bridges, Four Grade Separations At Massena, N. Y.

† IN the distant northern reaches of New York State, not far from the St. Lawrence River, which forms the international boundary, the Massena Terminal Railroad Co. is relocating and rebuilding a 2-mile stretch of single-track line. In this short distance the railroad crosses two rivers, the Grasse and the Racquette, and also passes over four streets or highways in the town of Massena. The Massena Terminal Railroad Co. is a terminal and switching railroad connecting the two vast railroad systems, the New York Central and the Canadian National, with the industrial district of Massena.

Construction of this line, including two open-deck plate-girder bridges for the river crossings, one all-concrete and three through plate-girder grade separations, together with miscellaneous structures, grading, and track work, is being done by the Harrison Construction Co. of Pittsburgh, Pa. Work began in March, 1945, on this \$1,000,000 project and will be completed by the end of this year.

The old single-track railroad had differences in grade totaling 56 feet in its 2-mile length, although the elevations at its termini were practically the same. With the building of tall river piers and high fills where necessary, the new road presents a smooth profile with a maximum grade of only 0.5 per cent, as against 2.0 per cent on the old line. The new alignment starts at the easterly end of the interchange yard which was recently enlarged and extended under a general development plan, of which the project described in this article is a part.

The greatest need for the improvement, however, came from the condition of the two river bridges, Warren deck trusses about 500 feet long erected in 1894, which were condemned for carrying such modern weighty loads as trains made up of 70-ton cars of ore pulled by heavy 600-hp diesel-electric engines. In addition to the replacement of these outmoded river bridges, the new line eliminates three grade crossings which were a hazard in the streets of the town, particularly since the trains had to travel at their best speed in order to make the grade with their heavy loads of alumina.

From the nine-track interchange yard lying on the south bank of the Racquette River, the new line follows a northerly course across the two rivers and through the town of Massena until it reaches the south bank of the Power Canal, a 52-foot-deep channel which diverts some water from the St. Lawrence to furnish power for an industrial plant. A new bridge was built across this canal in 1943 by the same contractor, enabling trains to reach a classification yard where cars moving from and to various plants and the line-haul railroads are weighed, made up into trains, and dispatched. Of the 2-mile stretch, about 1½ miles are being relocated.

Racquette River Bridge

Leaving the interchange yard on a 10-degree curve to the left, the new track will cross the Racquette River on a deck plate-girder bridge, 520 feet long, supported on five piers and two abutments, with the top of the rail 45 feet above normal water. This as well as all other bridges on the project is designed for Cooper E-60 loading, which is double the strength of the original truss bridges. The south, or

No. 1, abutment, together with the next two piers, Nos. 2 and 3, are on land while the following two piers, Nos. 4 and 5, are in the river. Pier 6 and abutment No. 7 at the north end are constructed on the shore. The three spans comprising the southern half of the bridge are on a continuation of the 10-degree curve from the interchange yard, while the northerly half of the bridge is on a tangent at a 52-degree skew with the river. The four main spans between the piers are each 100 feet.

The concrete piers will all rest on bedrock which was found about 25 feet below normal water underneath a mixture of sand, gravel, and boulders in varying depth. In constructing the three

(Continued on next page)

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Per POUND WEIGHT**

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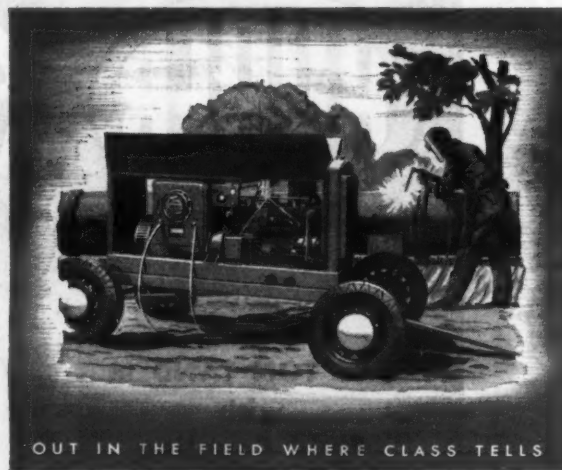
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In portable welders, for example, they deliver smooth, flexible power—so necessary for the constant idling and top speed requirements in industrial arc welding.

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in tractors, cranes, shovels, draglines, pumps, air compressors, generator sets, and other power applications in construction work, distinguishes them as "Horsepower with a Pedigree."

Mail the coupon today for illustrated catalog showing complete power range.

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C. & E. M. Photo
A Lorain 80 with a 3/4-yard Williams clamshell excavates for pier 3 of the Racquette River bridge.

Bridges 50 Years Old Replaced by Railroad

(Continued from preceding page)

piers on land, U. S. Steel sheet piling sections, MZ 38, 12 inches deep x 18 inches wide x 40 feet long, were driven to rock by a McKiernan-Terry No. 7 hammer in 45-foot swinging leads, suspended from the 85-foot boom of a Lorain 80 crane. Steam for the hammer was supplied at 150-pound pressure by an Erie 45-hp coal-burning vertical-type boiler.

The same crane with a Williams 3/4-yard clamshell bucket then excavated the cofferdam which was kept dry at first by a couple of Gorman-Rupp 2-inch pumps, and later by a 4 and a 6-inch pump of the same make as the excavation went deeper. When large boulders were encountered within the sheet piling, they were broken up by jackhammers driven by a Gardner-Denver air compressor.

Pile Driving

Work on the abutments proceeded concurrently with that of the shore piers, except that the abutments had for a foundation a pattern of Union Metal Monotube tapered piles instead of resting on rock. A subcontract for driving both sheet and Monotube piling was given to Equipment & Supplies, Inc., of West Elizabeth, Pa., which drove a total of 741 Monotubes on the entire project. These Monotubes, made from No. 7 gage steel, came in lengths of 25 feet, No. JN 14, and 30 feet, No. FN 12, with diameters of 14 and 12 inches respectively at the butt and tapering to a point. They were also driven as foundations for the grade-separation structures. In most cases only one length of pipe was necessary, but at the Grasse River abutments Monotubes 46 feet long were required. To obtain this length another section was slipped over the top of the first pointed-end section, and a weld was made over the 6 to 8-inch lap.

Each bridge abutment required an average of 60 Monotubes, with the rest going into the grade-separation structures. To drive these piles for the Racquette River abutments, a Vulcan 50C 6 1/2-ton steam hammer was used in 50-foot swinging leads with four guys to keep it in line. The leads were swung from a Lorain 82 crane with a 65-foot boom, and power for the hammer came from a 45-hp vertical-type boiler using water pumped from the river through a 2-inch line by a Hercules-driven Gorman-Rupp 4-inch pump.

Pier Construction

As the excavation for the piers on the banks of the Racquette continued, frames for strengthening the coffer-

dams were lowered into place by the crane. The lowest one, which was 4 feet above the bottom of the piling, consisted of 15-inch I-beams cross-braced at the center with a 14 x 14-inch strut. Four and a half feet above this rectangular framework was a similar frame, while above that in lifts of 5, 6, and 6 feet were pre-assembled timber frames, lowered into position by the crane and held in place, as were the others, by 3/4-inch rods hooked over the top of the sheet piling. Further vertical support came from six 6 x 12-inch posts between the frames.

This timber framework was assembled on the ground, using 14 x 14-inch sections for the main members with a 14 x 14 strut across the center for cross bracing, and a 14 x 14 knee brace in each corner. The members were fastened together by 3/4-inch bolts, with hardwood fillers, or wedges inserted between the connecting pieces so that they could easily be knocked out when it was time to disassemble and remove the frame. This framework, which cor-

responded to the inside dimensions of the cofferdam, measured 42 x 26 feet.

At the bottom of the cofferdam, jackhammers cut into the rock 1 foot to insure a solid foundation for the footings, and also eliminating the need for a

seal. Forms were then built for the footings which measure 36 x 16 x 7 feet deep. Sequence of operations saw the work of the piers on the banks being done first during the spring when the

(Continued on next page)



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Variable Weights

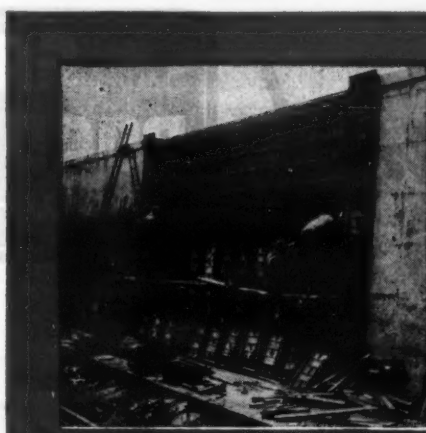
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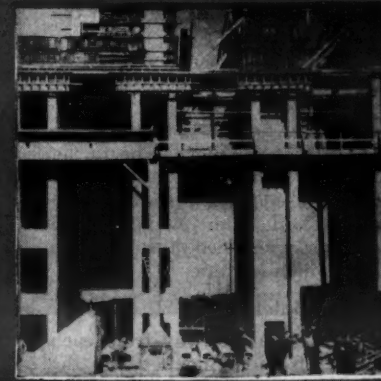
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C. & E. M. Photo

Union Metal Monotube piles for the foundation for abutment 7 of the bridge over the Racquette River were driven by a Vulcan 50C 6½-ton hammer in swinging leads from the 65-foot boom of a Lorain 82 crane.

comes from the Northern Quarries at Norwood, N. Y., and is hauled 15 miles in two Sterling 16-ton trucks which stockpile it at the plant. Sand is shipped by rail on the New York Central 150 miles from Boonville, and emptied from hopper-bottom cars into a pit beneath the siding track from where it is stockpiled by a Lorain 40-A crane with a 50-foot boom and a ½-yard Owen clamshell bucket.

This crane also keeps filled a Johnson double bin holding 30 yards of sand and 30 yards of stone, with a batching hopper for each aggregate through which the trucks are loaded before driving to the shed to pick up the cement. On the way out of the plant the truck-mixers got their water from a 500-gallon tank mounted on a platform so that it could flow into the drum by gravity. The tank was filled with water from the town supply by tapping a hydrant.

Concrete for the Monotube piles was delivered by three Rex Moto-Mixers, one 3-yard and two 2-yard, mounted

(Continued on next page)



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Ad 104

Bridges 50 Years Old Replaced by Railroad

(Continued from preceding page)

water in the rivers was high, together with the construction of the grade separations.

At the bridge site, the Racquette River is about 200 feet wide with a normal depth of 8 feet which rises in the spring to about 12 feet, but recedes during the summer months to as low as 4 feet. During low water this year, earth dikes will be built out in the river, 50 feet from each bank, to provide access for the construction of piers 4 and 5. The dikes will have a crown of sufficient width to accommodate the equipment, and will be constructed by trucks end-dumping a mixture of earth, gravel, and stone excavated from the nearby banks.

Form Work

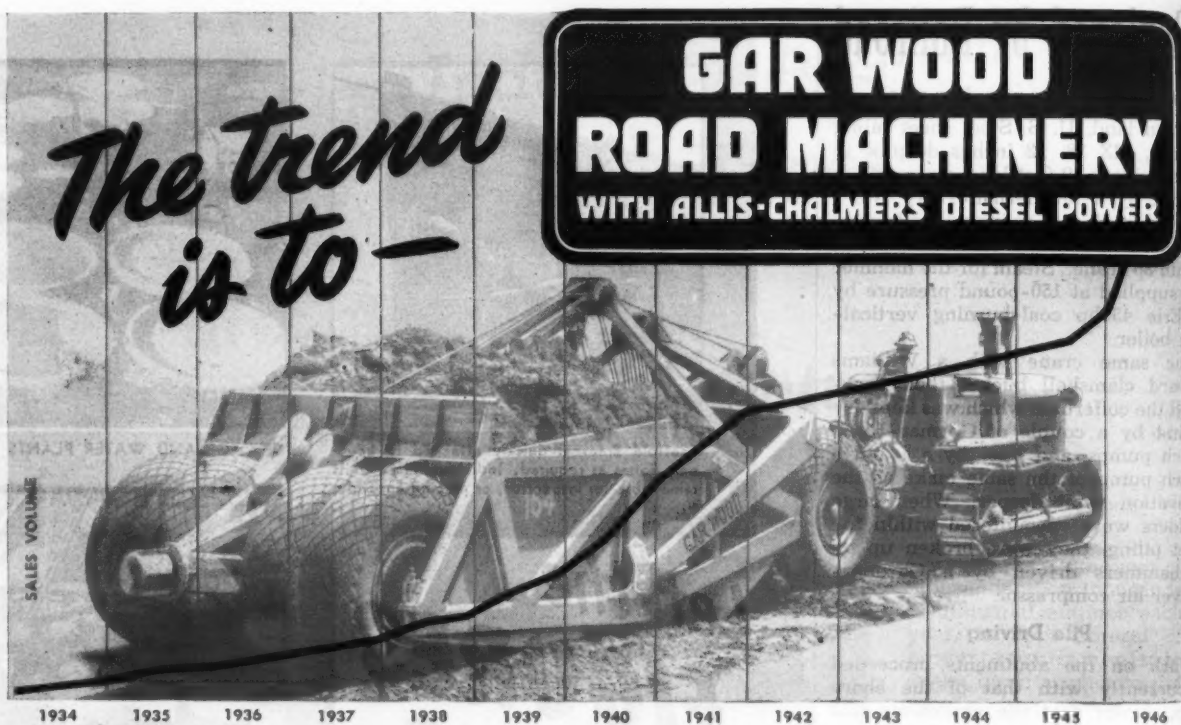
To speed up the great amount of form work required on this job, much of the lumber was cut on a woodworking machine which consisted of a 30-inch band saw, a 12-inch planer, and a 12-inch circular saw, the combined units powered by a Chevrolet 4-cylinder engine. The pier forms were mostly 1 x 6-inch tongue-and-groove stock, backed by 2 x 6-inch studs on 14-inch centers with double 3 x 8-inch horizontal wales set every 24 inches. Also at 24-inch spacing each way running through the wales were ¾-inch tie rods.

In building the forms for the abutments at the grade separations, a somewhat lighter design was used since these structures were not built to the same height as that of the piers. The facing and studs were the same, but double 2 x 6's were used for the wales, which were set 3 feet on centers, while ½-inch tie rods were fastened through the wales on 30-inch centers.

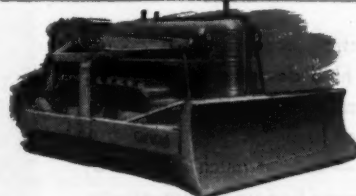
Batch Plant

At a point about halfway from each end of the job and lying between the two rivers, the contractor set up his yard and batch plant, where the old and the new tracks are but a few feet apart. Here is stored the reinforcing steel which is cut on a shearing machine and rod cutter, operated by a G-E 5-hp motor, and bent to shape on a Kardong bar-bending machine with a 1¼-inch-square capacity, driven by a Wisconsin engine.

Bag cement purchased from the Universal Atlas Cement Co. and the Alpha Portland Cement Co. is shipped, 1,200 bags to the car, via the New York Central RR to the siding at the batch plant where it is stored in a wooden shed. Crushed limestone for coarse aggregate



4-WHEEL CABLE SCRAPERS
Capacities: 11-15-20-25 cu. yds.



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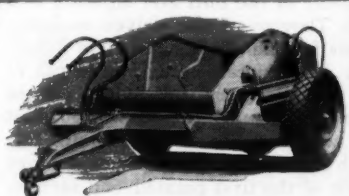
As a result, the demand for this equipment has steadily grown over a period of many years (see chart above) until now it has reached the proportions of a world-wide trend.

Here is a sound reason for specifying Gar Wood earth moving units. "Nothing succeeds like success."

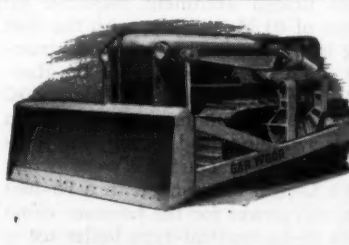
Contact your Allis-Chalmers dealer. Let him point out the superior features of Gar Wood Road Machinery and show you actual job performance in your territory with many satisfied users.



HEAVY DUTY RIPPERS
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HYDRAULIC BULLDOZERS with fixed blades, for all Allis-Chalmers Tractors

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C. & E. M. Photo
Concrete for abutment 1 of the Grasse River bridge was mixed by a MultiFoote paver and placed by a bucket swung by a Lorain 40 truck-mounted crane.

Bridges 50 Years Old Replaced by Railroad

(Continued from preceding page)

on Sterling trucks, while the large pier pours are made by a MultiFoote 34-E paver, and for the smaller-size pours the concrete is prepared in a Rex No. 5 mixer.

A typical 6-bag batch as used in the large paver is made up of the following dry weights:

Cement	564 lbs.
Sand	1,175 lbs.
No. 1 stone, $\frac{3}{4}$ to $\frac{1}{2}$ -inch	440 lbs.
No. 2 stone, $\frac{1}{2}$ to $\frac{3}{4}$ -inch	650 lbs.
No. 3A stone, $\frac{1}{4}$ to 2-inch	1,090 lbs.

In water pours, such as the Grasse River pier footings, an extra bag of cement is added to the 6-bag batch. With a water-cement ratio of about 0.7, an average of 250 pounds of water is added to each batch. In all of the above-ground pours 6 pounds of Pozzolite has been added to each batch to reduce the disintegrating effects of freezing and thawing after the concrete had set, for in this northern climate winter temperatures of 30 degrees below zero are common. This cement-dispersing agent was purchased in 50-pound paper sacks, and stacked alongside the mixer during the pouring operations. The Pozzolite was dumped into a wooden box from which it was measured out in a triangular-shaped wooden shovel holding an even pound, and added to the skip by a laborer who also cleaned up around the mixer and hit the skip with a sledge hammer to insure all the material going into the drum.

Concrete Pours

In pouring concrete for the Monotube piles the mixing time in the truck-mixers varied from 3 to 20 minutes, depending on the length of the haul. The concrete was conveyed from the drum to the piles by chutes.

For the other pours a fleet of five International trucks of 2-batch capacity haul the materials to the paver. In some locations where the batch trucks have to back down steep hills to reach the paver, a Caterpillar D7 tractor is kept on hand to pull them back up the hill to the haul road. After the concrete is mixed 1½ minutes it is dumped directly into a 1-yard concrete bucket which is lifted to the forms by a Lorain 3M Moto-Crane with a 30-foot boom. In the bridge pours water for the paver is pumped from the river by the same pumps that supplied the water for the

boilers during the pile driving, while for the grade separations the water is tapped from nearby hydrants.

Mall vibrators are used on the concrete as the forms are being filled. The form tie rods are generally pulled the day following the pour, but the forms are left in place for an additional 24 hours, then removed, after which the fresh concrete is cured with wet burlap. The concrete has tested 2,850 pounds after 7 days and 4,000 pounds after 28 days.

After the footings were poured, the sheet piling was pulled by a No. 800 Vulcan extractor and the pier forms were erected. At the Racquette River the top of the piers is 62 feet above the bottom of the footing. The pier shafts have rounded noses on the up and downstream sides and have a batter of ½ inch to the foot. The marks left by the forms are removed from the piers by a Mall grinder and buffer.

Steel Superstructure

The structural steel used on five of

the structures was fabricated and will be erected by the Bethlehem Steel Co., and is being shipped to the yard on flat cars. The Racquette River bridge will have twelve girders, averaging 35 tons each, located two to a span and 7 feet apart on centers. The 100-foot-long girders for the main spans are made up of a 108 x ½-inch web, four 8 x 8 x ¾-inch angles, and two 18 x ⅝-inch cover plates. On top of the piers are rockers to support the girders.

On this open-deck construction, standard wooden ties, 8 x 10 inches x 10 feet long, will be placed across the girders on 12-inch centers. To the ties will be fastened 105-pound rails, and within their 4-foot 8½-inch gage guard rails will be laid 9 inches inside each rail. Guard timbers, 5 x 8-inch, will be strung along the ties 1 foot 6 inches outside the gage of each riding rail.

East Hatfield Road Bridge

Almost immediately after leaving the Racquette River bridge going north, the new line crosses East Hatfield Road

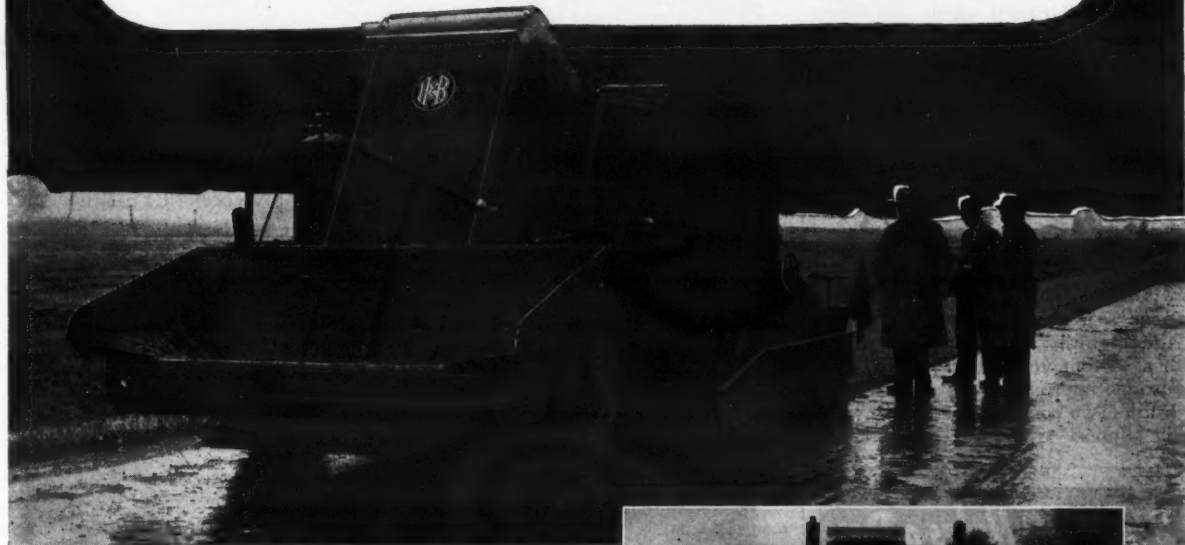
on the first grade separation which is about ¼ mile east of the old grade crossing, the greatest distance between the old and the new alignments. The new structure crosses a 20-foot black-top pavement on a 67-degree skew, and has three spans of 30-40-30 feet respectively, with the two outer spans being of deck plate-girder construction and the main span a through plate-girder, all providing 14-foot clearance.

Each of the two main piers rests on 24 Monotube piles while each abutment is supported on 10 piles. The deck girders are spaced 6 feet 6 inches on centers and carry a concrete trough which will hold the ballast and track. On the main span the through girders are 5 feet deep, and are set 16 feet 6 inches on centers with 14-inch wide-flange 119-pound floor beams to support a covering of wrought-iron plates, waterproofed with asphaltic concrete, membrane waterproofing, and asphalt blocks. The waterproof-deck construction is necessary over traveled roads to

(Continued on next page)

MOTO-PAVER

The Last Word in Asphalt Mixing and Paving

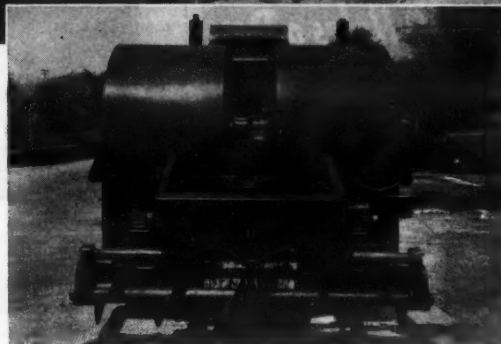


A Complete Traveling Asphalt Mixer and Paver

Engineered and built by America's oldest manufacturers of asphalt mixing equipment, the H & B MOTO-PAVER has been designed to meet the present day need for a highly flexible, mobile and efficient traveling mixer and paver in one self-contained, self-propelled unit.

The MOTO-PAVER mixes, spreads and lays any type of mixed-in-place bituminous material to any road width, thickness and crown condition. No separate loader, spreader or other paving equipment is required—no trailer to haul it from one job to another. The MOTO-PAVER does the complete mixing and paving job, and travels from one job to another under its own power.

Mounted on pneumatic tires, the MOTO-PAVER is powered by two gasoline engines—one driving the mixer and related units, the other driving the machine along the road. Paving speed is from 4 to 50 feet per minute, road speed up to 18 miles per hour. Mixing



capacity is 100 to 120 tons per hour. The MOTO-PAVER will handle all but the highest types of bituminous concrete.

Especially suitable for resurfacing trunk roads and streets of smaller municipalities, the MOTO-PAVER is also an efficient unit for new construction work on roads, streets, airports, parking lots, driveways, etc. Bulletin MP-46, giving complete information and specifications, will be sent on request.

HETHERINGTON & BERNER INC.

731 Kentucky Ave., Indianapolis 7, Indiana

Hetherington & Berner

BUILDERS OF PORTABLE AND STATIONARY ASPHALT PLANTS OF ALL TYPES AND CAPACITIES

Bridges 50 Years Old Replaced by Railroad

(Continued from preceding page)

catch drippings from the trains, and also sparks and cinders should steam locomotives be used at any time on this line.

At this crossing the grade of the street had to be lowered 5½ feet which was not done until after the piers and abutments were erected. Consequently the sides of the excavation were lined with 2 x 10-inch wooden sheet piling to prevent cave-ins during the driving of the Monotube piles which were cut off at a point so that they would extend 1 foot into the footing. The sheet piling was braced with two frames composed of 12 x 12-inch sections, set 6 feet apart vertically, and separated by 12 x 12 posts.

Cut and Fill Sections

North of this first grade-separation structure, the new railroad cuts through a hill, and then crosses a swamp on a fill through which a box culvert is being built. Because of the heavy snowfalls in this region, 10 feet in the winter of 1944-1945, the cuts are made 30 feet wide, or large enough for three tracks, affording room for snow dispersal. The fills are built with a 20-foot crown and have 1½ to 1 slopes as do the cuts. The ties are laid 22 inches on centers on a 10-inch layer of crushed limestone.

After leaving the swamp the new roadbed follows the alignment of the old track, but the grade is gradually raised until at East Orvis Street, which is also U. S. 37, the fill is 14 feet high. Material for the earth work was taken from the cuts by power shovels and transported in a fleet of Euclids to the fills where it was dumped, and spread and compacted by a Caterpillar D8 and bulldozer. Additional material also came from a borrow pit at the middle of the job, and from the spoil bank alongside the Power Canal.

East Orvis Street Bridge

The East Orvis Street grade separation is a 99.5-foot through plate-girder span on a 72-degree skew. The grade of the highway was left undisturbed with a 14-foot vertical clearance since the bridge approaches are carried on a high fill. Two concrete piers with wing walls support two 9-foot girders, on

19-foot centers, across the bottom of which, on 33-inch centers, are stretched 14-inch WF 136-pound floor beams, which carry the waterproof deck, ballast, and track.

On the fill side of all piers and abutments two coats of asphalt emulsion were applied as damp-proofing, in order to keep water from the earthwork "sweating" through and appearing on the face of the bridge.

Grasse River Bridge

Less than 200 feet north of the East Orvis Street structure the railroad will cross the Grasse River on a 640-foot deck plate-girder bridge supported on six piers and two abutments of concrete construction, with five main spans of 100 feet each and two end spans of 75 feet. As in the case of the other bridges, the abutments rest on Monotube piles and the piers on solid rock. At this bridge site the bed of the river is practically solid rock with little surface material to be excavated.

A cofferdam in the shape of a box was

built on land in two sections, which when joined together was 3 feet larger in both length and breadth than the pier footing which was constructed inside it. Made from 1 x 6-inch tongue-and-groove stock, the box was supported by 3 x 6-inch vertical studs on 20-inch centers, with a 3 x 6-inch cap running around the top and double 3 x 6-inch wales every 24 inches for its 8-foot depth. Four feet outside this box, but connected to it by cross bracing, was a similarly constructed box forming a double wall.

This wooden structure was anchored in place at the site of the pier footing and the 4-foot opening between the walls was filled with alternate 6-inch layers of clay and rock, clay to make a seal and rock for ballast. The cofferdam was then unwatered by two C. H. & E. 90M centrifugal pumps.

To get a good bond for the foundation, the rock within the cofferdams was drilled, blasted, and removed to a depth of 7 feet over the area of the footing, and then poured with concrete without

having to use any forms.

The piers, with a base of 30½ x 14½ feet, were poured to a height so that the top of the rail is 61 feet above normal water. On these will be placed the deck plate-girders, spaced 7 feet on centers, and which on the main spans will consist of a 108 x ½-inch web, four 8 x 6 x ⅝-inch angles, and two 14 x ⅝-inch plates. The construction features and equipment used are the same as those to be employed on the Racquette River bridge, with a gravel road built out from each bank for the work on the river piers.

One of the 100-foot deck-plate-girder spans will be of structural aluminum. The span has already been fabricated by the Bethlehem Steel Co. at its Rankin Works and will be erected as a unit, complete and ready for the bridge timbers.

Equipment is shunted on flat cars back and forth across the river on the old bridge which lies just west of the new structure. Although this old

(Continued on next page)



Douglas Fir Plywood
provides smooth, rigid
forms for better concrete jobs

Every panel of genuine Douglas fir plywood PLYFORM carries a distinctive green edge-sealing and a diamond-shaped "grade" trademark. PLYFORM is the only grade of Douglas fir plywood made especially for concrete form work.

For smooth, flawless concrete surfaces—use Douglas fir plywood PLYFORM, the grade made especially for concrete form work. It's light in weight, easy to handle. It's cross-laminated in construction — strong, rigid, durable. As many as 15 re-uses have been reported.

Because PLYFORM panels are sanded satiny smooth they produce concrete surfaces that are really smooth. Joints and fins are held to a minimum. Rubbing costs are reduced.

Take advantage of PLYFORM'S many outstanding qualities. For technical data on this proven product, write the Douglas Fir Plywood Association, Tacoma 2, Washington. For prices and delivery information, see your lumber dealer.

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For Foundation Footings . . . Highway and Industrial Fencing . . . Rural Telephone and Light Poles . . . Airports . . . Cemeteries . . . Holes for Dynamiting, etc.



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Quickly mounts on all row crop tractors; also available for all crawler-type tractors. Drills at any angle, up to 54° deep. Standard auger sizes from 4" to 12". Operator stands on platform, behind protective handrail . . . out of dirt . . . away from moving parts. Built extra strong for toughest digging operations. Drills through hard dirt, frosted ground, roots and gravelly soils. Thousands in use by state highway departments, utility companies, U.S. Gov't. engineers, etc. Thoroughly proved. Guaranteed.

WRITE for details and prices . . . available now . . .

R. J. PIPER MANUFACTURING CO.

Princeton, Illinois
New York Office: 190 E. 42nd St.

Above: Completed bleacher section of a high school stadium in Los Angeles. PLYFORM gave the concrete work a smoother, more attractive finish.

Right: A close-up of the PLYFORM forms in the bleacher section, before stripping.

Douglas Fir Plywood Association
Tacoma 2, Washington

Bridges 50 Years Old Replaced by Railroad

(Continued from preceding page)

bridge was condemned for railroad loadings, there is a possibility that it may be rebuilt and used for highway purposes, with the old roadbed converted into a street through the town.

Concrete Structures

Two large concrete retaining walls were required to be built alongside the high fills, one to the south and the other to the north of the Grasse River. The one to the south keeps the earth from spilling over a cluster of gas tanks, while the larger wall to the north flanks one side of a Central New York Power Co. substation. This latter wall is 135 feet long with a footing 17½ feet wide and 4 feet deep; at the base the wall is 3 feet 5 inches wide and tapers to 1 foot 3 inches at the top in 26 feet of height.

Another reinforced-concrete structure north of the Grasse was built at Center Street for the railroad to pass over an access road leading to a parking lot. This bridge, with two concrete abutments and a center pier resting on Monotube piles, has a total span of 28 feet 10 inches with a roof slab 1 foot 10 inches thick. The structure has a vertical clearance of 14 feet. Two 12 and 18-inch water mains from the Massena water works ran through the center line of this bridge and had to be relocated.

Wooden Trestle

At one point north of the Grasse River the new line of the railroad crosses the old track, but at about a 20-foot difference in elevation since the new route is on a high fill to meet the grade-elimination structures. In order to maintain rail traffic, a temporary wooden trestle, 200 feet long, was built to carry the new track over the old line, which had to be rerouted on a parallel course east of the new construction.

When the connecting fill at either end of the trestle is completed and the track laid over the entire route, the trains will then operate over the new line while the old track below is removed and the fill placed around this temporary trestle. The piles will be left

in place, but the caps and stringers will be removed and replaced with ballast to receive the ties and rails.

The temporary trestle, designed for E-40 loading, was made up of sixteen 4-pile bents on 14-foot centers with 40 to 45-foot piles having a minimum diameter of 14 inches at the butt. Each pile was driven to 15-ton bearing capacity by the Vulcan 50C 6½-ton steam hammer operating in 68-foot leads swung from the 85-foot boom of a Lorain crane. The two inner piles were driven 4 feet apart on centers while the outer piles, 2 feet distant, were driven at a batter. The piles were capped with 12 x 14's, 14 feet long, which were connected by stringers, six 8 x 16's to the span. The bents were cross and longitudinal-braced with 3 x 10's.

At the center point of the trestle directly over the old track a special span was constructed of seven 24-inch WF 74-pound steel beams. This steel span is 39 feet long, and is supported at each end on double pile bents, providing a vertical clearance of 21 feet from the

top of the rail below.

Park Avenue Bridge

The last and northernmost of the grade-crossing eliminations is at Park Avenue which leads to Massena Center by way of a vehicular bridge across the Power Canal. The Park Avenue structure has a 63½-foot span with a 14½-foot vertical clearance, and has abutments 26 feet long with straight wings averaging 20 feet in length on each side, and with walls 1 foot 3 inches thick. The two through plate-girders consist of an 84 x ½-inch web, four 8 x 6 x ¾-inch angles, and two 18 x ¾-inch cover plates, set at 17½-foot centers. Supporting the waterproof deck and tracks will be 14-inch WF 119-pound steel floor beams.

Above this bridge the new line required the removal of some wooden coal sheds, a frame dwelling, a brick building, and two bays from a brick industrial building. Then it leaves the fill and descends to grade, meeting the old track which runs parallel to the

south bank of the Power Canal for about 1,500 feet before crossing the canal on a bridge which was built two years ago.

Quantities and Personnel

The major items included in this new construction are:

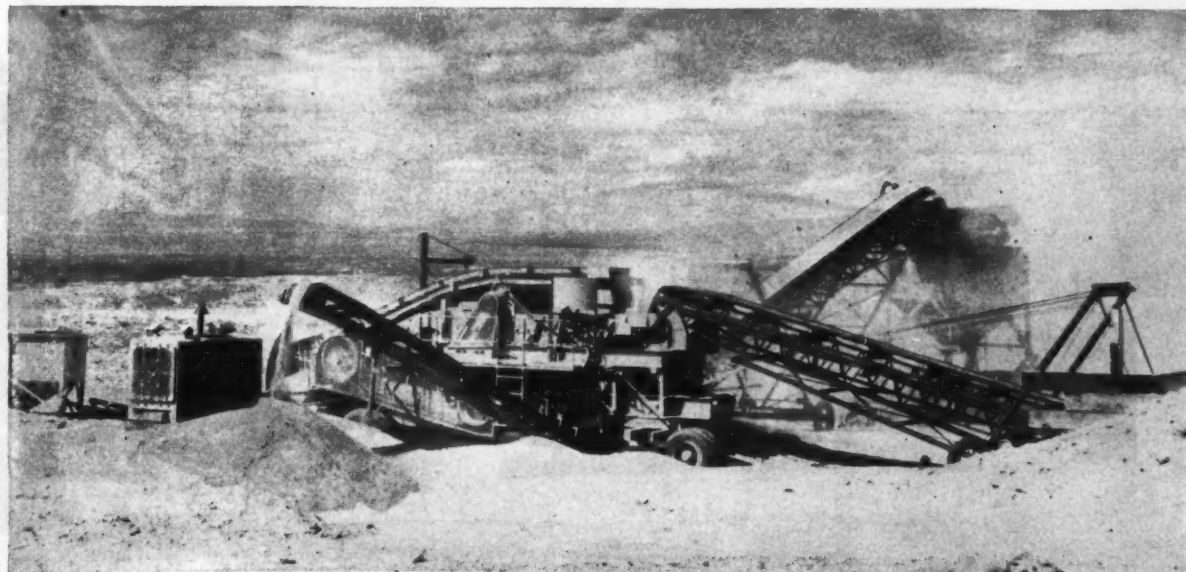
Removal of track	6,260 lin. ft.
Construction of temporary track	3,023 lin. ft.
Grading	137,741 cu. yds.
Muck excavation	4,000 cu. yds.
Concrete	7,661 cu. yds.
Reinforcing steel	589,027 lbs.
Timber piling	3,000 lin. ft.
Tapered steel pile casings	22,331 lin. ft.
Structural timber in temporary trestle	22 MBM
Solid-rock excavation under structures	616 cu. yds.
Structural-steel girder bridge spans	1,114 tons
Main-line track on roadbed	8,167 lin. ft.
Main-line track on bridges and viaducts	1,160 lin. ft.

A topographical survey of the area was made for the Massena Terminal Railroad by C. E. Smith & Co., Consulting Engineers of St. Louis, Mo., in 1941, when it became evident that modern heavy equipment with relatively heavier loads could no longer be safely carried over the existing bridge structures. After the new alignment

(Concluded on next page)

A BIG PLANT FOR THE BIG JOBS

...where low cost is all-important



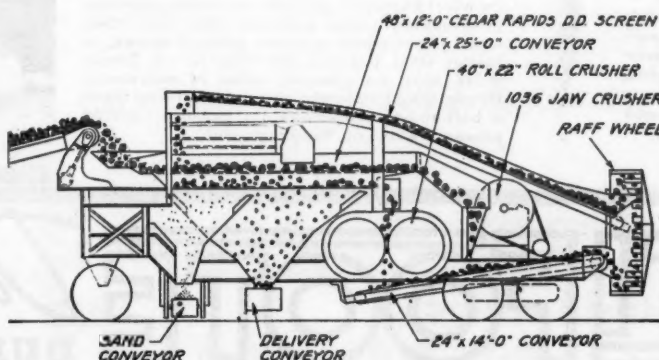
The Cedarapids Master Tandem

HERE'S a portable gravel plant that really lives up to its name—MASTER—master of low-cost operation for your big aggregate producing jobs. It contains all the features that mean big capacity, trouble-free operation and low cost. Horizontal vibrating screen assures greater capacity and closer grading. Large roller bearing jaw and roll crushers have plenty of capacity for smooth operation for every pit condition. V-belt and universal drives eliminate troublesome chains and sprockets. There are dozens of other exclusive features that make the Master Tandem today's most modern, all-purpose crushing plant. Get the facts from your nearest Cedarapids distributor.

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Cedar Rapids, Iowa, U.S.A.

"Life Seal" conveyor bearings
require no field lubrication.
Quickly convertible to
quarry plant by adding
portable primary.
No lost time for setting up
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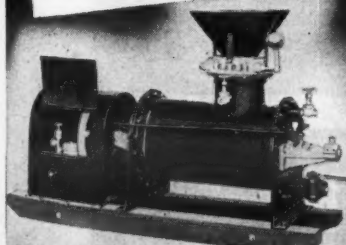
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- BELT CONVEYORS—STEEL BINS
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- VIBRATOR AND REVOLVING SCREENS
- STRAIGHT LINE ROCK AND GRAVEL PLANTS
- FEEDERS—TRAPS
- PORTABLE POWER CONVEYORS
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- BATCH TYPE ASPHALT PLANTS
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- WASHING PLANTS
- TRACTOR-CRUSHER PLANTS
- STEEL TRUCKS AND TRAILERS
- KUBIT IMPACT BREAKERS

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The Union Grout Mixer and Ejector does a thorough job, whether for roadbed stabilization or any other type of grouting requirements. Send for bulletin No. 195.

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Bridges 50 Years Old Replaced by Railroad

(Continued from preceding page)

was determined and the structures designed, the engineering department of the Railroad began a location stake-out in December, 1944, to have everything in readiness for the first concrete pour on April 12, 1945.

An average of 100 men has been employed throughout the job by the Harrison Construction Co., with most of

the laborers being Indians from the St. Regis Reservation, 15 miles to the east. The Indians are good workers but dislike working a full week, being content with two, or at most three, days of work in one week. Robert M. Peach is Superintendent for the Harrison Construction Co., while Alfred Kist was Superintendent for Equipment & Supplies, Inc., which did the pile driving.

For the Massena Terminal Railroad, Frederick Heinzelman is Construction Engineer in charge of field operations, and C. O. Doetting is Operating Su-

perintendent for the Railroad with offices at Massena. W. J. Nuebling is Chief Engineer, with headquarters at East St. Louis, Ill.

New Rubber Compounds Described in Bulletin

Research designed to combine the inherent advantages of manufactured and natural rubbers and other elastic materials is reflected in Flexlastics, produced by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., for

use in its synthetic-rubber products. Plastic ingredients, age-resisting chemicals, pigments, fillers, and other substances are compounded with strengthening members to form types of rubber needed for special uses.

Details concerning the processes used in making Flexlastics, and their application in various products are given in a new folder available from the firm. Mention this notice and ask for Form 6885 when writing the Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J.



Condensed Specifications

CAPACITY: 34 cu. ft. plus 10% on 6% grades. Bucket capacity 55 cu. ft.

LOADING SKIP: 118 in. wide. Renewable discharge spout liner.

SKIP HOIST: Hoist drum tapered and spiral machine grooved. Twin Disc clutch. Timken Bearings. 158 sq. in. braking area.

DRUM: MultiFoote Double Cone, Double Compartment. Machined rollers and roller paths. Renewable liners. Rotary discharge and transfer chutes of high carbon steel, renewable wearing plates.

BOOM: Boom 10 in. channels of high carbon steel. Swings, raises and lowers by power. Length 35 ft.

TRACTION: Gear driven. Working speed .6 miles per hr. Travel speed 1.1 miles per hour.

ENGINE: Hercules HXC, piston displacement 779 cu. in. All standard equipment. Power take-off: Twin Disc clutch and a Lovejoy coupling. Diesel power available if desired.

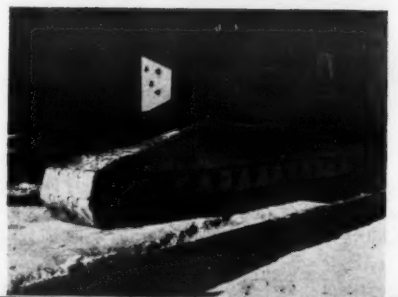
LUBRICATION: All bearings fitted with Alemite-Zerk high pressure grease gun connections.

All the MultiFoote Advantages

A big paver doesn't need to be complicated—look at this simple main drive shaft and clutch assembly! Like the rest of the DuoMix, it is easy to get at, rugged and dependable in operation. Other proved MultiFoote advantages include: Sealed in oil helical-cut-gear power take-off; Timken bearings on all high-speed shafts; MultiFoote Double Cone Drums for thorough mixing; no-pressure water system with large standby tank; wide, solid, fast-charging skip; high, full-visibility operating platform; fast traveling bucket with all mechanism outside; and heavy cross-braced main frame.

New, Exclusive Crawler Design

No "nutcracker" action between treads on this crawler! Exclusive MultiFoote design provides interlocking joints between alloy cast steel tread plates which prevent entry of stones, no matter what position the tread is in. Single drive lugs, on alternate sides of successive treads are completely self-cleaning and have a ball-and-socket action for uniform bearing pressure even on rough ground.



MULTIFOOTE Duo Mix

DUAL DRUM

Brooks Moves Offices; Two New Gear Products

News of two new products has been released with the announcement that the Brooks Equipment Corp. has consolidated its executive and sales offices with its production facilities at Hoboken, N. J. Until recently the firm maintained offices in New York City, its newly elected President, A. J. Quinn, reports.

Designed to connect shafts forming any angle from 0 to 95 degrees, one

product is the Flexible Gear Turret. A unique arrangement of the bevel gears attached to shafts supported in hinged housings permits the shafts to oscillate and rotate simultaneously. Horsepower capacities, based on the Lewis formula, are consistent with standard power-transmission practice for shafts ranging in diameter from $\frac{3}{4}$ to $1\frac{1}{2}$ inches. Two types of brackets for mounting the gear boxes are offered.

A newly developed steel universal joint has also been announced, by the firm. It employs a device which pro-

vides a positive lock for the pins and a convenient method of disassembling. Heat-treated precision-ground alloy steel is used.

More complete details on these products may be secured by writing the Brooks Equipment Corp., 217 Hudson St., Hoboken, N. J. Mention this item.

Rotary Pump Bulletin

The operational features of the new rotary pump announced recently by the Blackmer Pump Co. are described for

the first time in a bulletin just issued by the firm. Replete with photographs, diagrams, and charts, the 8-page brochure explains the swinging-vane principle which makes Blackmer pumps self-adjusting for wear. The removable liner and other features of the rotary pump and various installations are shown.

Copies of the booklet, "Facts About Rotary Pumps", may be secured from the Blackmer Pump Co., Grand Rapids 9, Mich. Just mention this notice and ask for Bulletin 307.



the
MULTIFOOTE
DuoMix
(DUAL DRUM)
34-E CONCRETE PAVER

High Speed • Real Maneuverability
MultiFoote Dependability for Better
Profit Margins on Your Contracts . . .

THE FOOTE CO., INC.  **1916 State St.** **Nunda, N. Y.**

HERE are a few of the basic facts about the new MultiFoote DuoMix 34-E Concrete Paver—though you'll have to see this simple, rugged machine in action to fully appreciate all the features for smoothness and speed that made the first contractor who tested it insist on buying the pilot model after the trials were completed.

Mechanical delays in the fully automatic mixing cycle have been cut to a minimum—seconds and fractions of seconds clipped from charging, transfer, discharging and dumping add up to extra, profit-making batches on each day's work . . . Main problem on test jobs was to get batch

trucks coming fast enough to give the DuoMix a fair workout. Under heavy work schedules, there has been no time out for alterations or repairs—MultiFoote dependability worthy of the long line of Foote pavers.

Traveling on narrow shoulders and soft grades brings reports that the MultiFoote DuoMix is "light on its feet," and highly maneuverable for a paver of this size. Details on the exclusive new traction are given at left.

Your order should be in soon for early delivery. Check with your MultiFoote Distributor or write direct today for complete information.

34-E

CONCRETE PAVER

ADNUN Black Top Pavers

MULTIFOOTE 27-E

SINGLE DRUM 34-E



British Combine Photo

DAM. In spite of wartime problems, this mile-long dam at Haweswater, Mardale, England, was built during the war years to furnish Manchester's water supply.



MOVING GRAVEL. Shelby County, Tenn., uses a Northwest shovel to load gravel for roads. Six Caterpillar W10 wagons pulled by DW10 tractors haul 1,100 yards of material in a 9-hour day.



QUICK LOADING. Shot rock from an open quarry fills a 6 to 7-ton truck in 45 to 60 seconds by means of this Athey Mobiloader on a D8 tractor. This outfit is used by the U. S. Engineers for riprap on the Missouri River.

SIDE HILL. Cuts up to 220 feet of Portland, Ore., Wash. Isaacson and LeTourneau haulers on D8

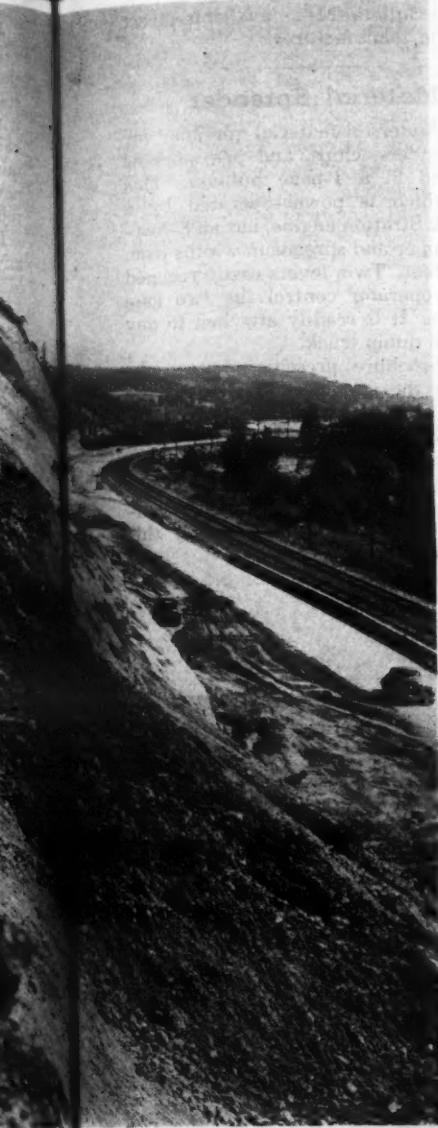


News P



OSCAR
Chicago
4-13

encountered by contractor Leonard & Slate
relocating Route 99 north of Woodland,
Oregon. Bulldozers and D8 tractors are moving the earth.



FIRE TRAILS. Maintaining trails in national forests is an important phase of the U. S. Forest Service fire-prevention work. Here an International MD diesel tractor with a Trojan 10-foot blade is at work in the Angeles National Forest in southern California, averaging 2 miles of road shaping an hour.



CRUSHER SET-UP. A portable Pioneer plant of the Houston Clinton Co. of Hillsboro, Texas, averages 1,589 yards of limestone in a 10-hour day with a 24 x 36-inch jaw crusher and a 40 x 22-inch roll crusher.

vs Photos

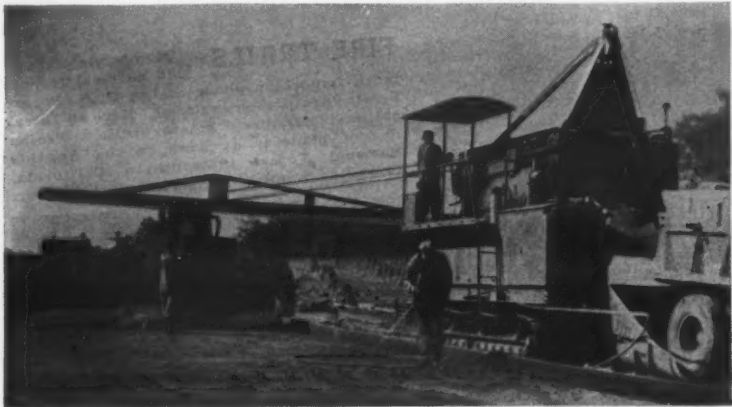
AED. Associated Equipment Distributors take time out from the manufacturers' luncheon to pose for the camera man (below). The occasion was their 27th Annual Meeting in January at the Edgewater Beach Hotel, Chicago. See page 21.



27TH ANNUAL MEETING
ASSOCIATED EQUIPMENT DISTRIBUTORS
EDGEWATER BEACH HOTEL, CHICAGO, JANUARY 27-31, 1946
PHOTOGRAPH BY CONTRACTORS AND ENGINEERS MONTHLY
EDGAR J. BUTTENHEIM PUBLISHER



PIPE HANDLING. An unusual method of handling concrete storm-sewer pipe was used by the Moore Engineering Co., Mt. Vernon, Ill. A Traxcavator on a D4 tractor scooped up the pipe sections and lowered them into place.



The new MultiFoote Duomix 34-E is featured by fully automatic control.

New Dual-Drum 34-E To Speed Paving Jobs

Fully automatic control, which is reported to cut charging, transfer, and discharging time to a minimum, features the new MultiFoote Duomix paver announced by the Foote Co. The new 34-E dual-drum unit is said to incorporate a number of features new to a paver of this size.

On a pilot test which involved the paving of a 6-mile reconstruction project, the Duomix turned out 10 per cent oversize batches (37.4 cubic feet) every 35 seconds, it is reported. Whenever enough batch trucks were available, runs ranging from 60 to 80 batches an hour were made, despite the necessity of moving the paver back and forth in order to put on a final 3-inch top course after placing reinforcement. The Foote Co. reports also that the original pilot model of the new Duomix in its first test laid approximately 45,000 cubic yards of concrete without any time out for repairs.

The traveling mechanism in the Duomix is driven from the single main shaft, which also provides power for the drums and skip hoist. A new type of crawler-tread plate eliminates the "nutcracker" action of stones lodged in the joints. The drive lugs on the treads are on alternate sides of adjacent treads for even distribution of bearing pressure. The paver has forward and reverse speeds. The Duomix's transfer and discharge chutes are of the rotary type, and the drums are of the MultiFoote double-cone design.

More complete details on the new Duomix 34-E paver can be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY who write the Foote Co., Inc., 1916 State St., Nunda, N. Y.

Caterpillar News

Following the resignation of Frank Pogolotti as Supervisor of Export Engine Sales, the Caterpillar Tractor Co., Peoria, Ill., has announced that the duties of the post will now be carried out by J. A. Gibb, Assistant Export Manager. Mr. Pogolotti, with the firm since 1931, has become Manager and Chief Engineer for the Mexico Tractor & Machinery Co., Mexico City, a Caterpillar distributor.

Expanding its research activities, Caterpillar has announced the promotion of three Research Directors and an Assistant Engineer to posts as Assistant Directors of Research. Dr. L. A. Blanc is now in charge of physical, chemical,

combustion, and metallurgical research projects; W. L. H. Doyle, of special investigations, general research, and liaison with other research groups; C. R. Maxwell, of diesel engines studies, combustion systems, and fuel injection; and C. R. Schad, of organization, personnel, and operational activities.

Diaphragm-Pump Line For Rugged Service

Designed to pump clear liquids in large volume and also to handle heavy liquids such as mud, slush, etc., Marlow Mud Hog diaphragm pumps are again in full production, Marlow Pumps, Ridgewood, N. J., has announced. This line of general-service pumps has available 3 and 4-inch single and 4-inch double sizes, with capacities from 3,000 to 9,000 gallons per hour.

Ball valves render the Mud Hog virtually clogproof, it is said. Power for hard work is applied by the Marlow steel walking beam. Diaphragms are easily changed, and valve obstructions removed in little time. Heavy-duty bushings, bronze on hardened steel, and gears running in oil give the pump added stamina. Briggs & Stratton or Wisconsin engines power the single pumps, and Briggs & Stratton, the double models. Steel-wheel or pneumatic-tired mounting may be had.

Further details, specifications, and

data on these and other Marlow pumps of the plunger, sludge, electric, and centrifugal types are given in a new 12-page Bulletin M-45, available direct from the manufacturer.

Material Spreader

The Anderson material spreader for sand, cinders, chips, and pea stone is described in a 4-page bulletin. This unit, which is power-operated by a Briggs & Stratton engine, has an 8-foot-long hopper and spreads in widths from 8 to 24 feet. Twin levers easily reached by the operator control the two gate openings. It is readily attached to any standard dump truck.

The brochure presents photographs showing the spreader attached to the back of a truck, standing on the road awaiting another truckload, and various other views. Copies of this Catalog 103 may be secured from the Anderson Engineering Co., 225 Bent St., Cambridge 41, Mass., by mentioning this magazine.



WOOLDRIDGE

EARTHMOVING EQUIPMENT

Includes



* SCRAPERS

Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.



* POWER CONTROL UNITS

Single and multiple drum with universal or roller fairleads.



* BULLDOZERS

Tough and rugged design for standard makes of tractors.



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Adjustable angle-blades for standard tractor mounting.



* RIPPERS

Available in light, medium and heavy duty models with two sizes to each model.

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FACILITIES IN ALL PRINCIPAL
AREAS & FOREIGN TERRITORIES

on steep pulls - FULLY LOADED

The Terra-Cobra's massive articulated King-Pin coupling is employed to permit flexible travel over rough rocky or uneven ground, at all speeds and with full loads. This exclusive Wooldridge feature permits either or both units to tilt in opposite planes even on sharp turns. With maximum load balance on this single pivot there is never any tendency to sky or dip. Get acquainted with Wooldridge today . . . write for Bulletin TA-425 for full details.

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Hi-Speed Self-Propelled
EARTHMOVERS

SAVE 50% ON FUEL AND
WAITING TIME

when Heating
& Melting
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AEROIL THE
FAMOUS
HEET-MASTER

55, 80, 115 and 165 gallon sizes on skids, on steel wheels and on pneumatic tires. Send for FREE Bulletin No. 2800C (specifications, prices, etc.)
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Chicago 16 San Francisco 7 Dallas 1

Loaders and Other Tractor Attachments

The Lull universal loader and a variety of auxiliary equipment are outlined in an 8-page illustrated booklet available from the Lull Mfg. Co. The loader is a front-end attachment for wheel tractors that can be used for digging, dozing, cleaning, and loading duties in construction, road and airport maintenance, equipment shops, and many other locations. Lull attachments include a rotary broom, a 2½-

yard snow bucket, and a bulldozer.

These tractor attachments and the loader itself are pictured in the folder, Form AD-6, which may be secured from the Lull Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn.

Fire Extinguishers

Generally Available

Various types and sizes of fire extinguishers which have been scarce during the war are again becoming generally available, the Pyrene Mfg. Co.

of Newark, N. J., reports. The condition of jobber and dealer stocks is steadily improving and a further rapid improvement is expected. Recharges for almost all types are currently on hand.

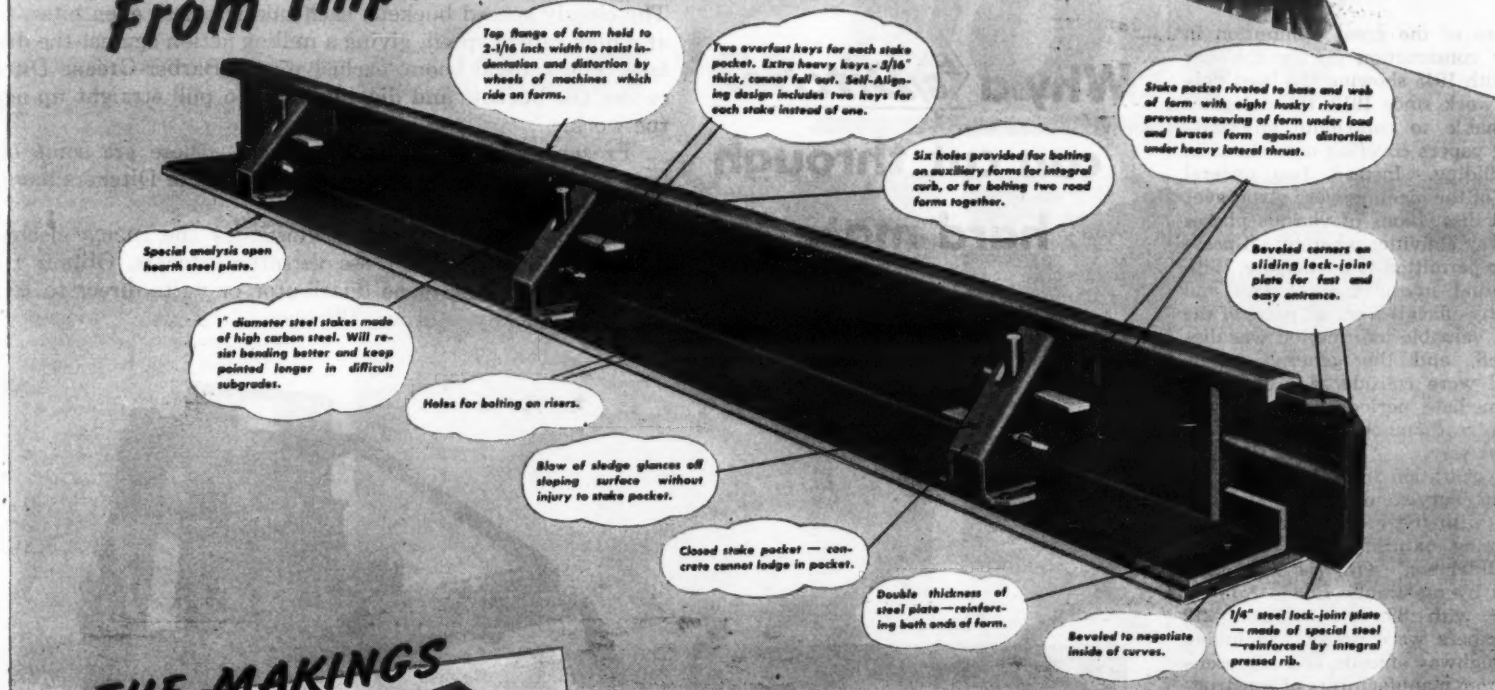
Vaporizing-liquid (carbon-tetrachloride base) extinguishers of the pint, quart, and 1½-quart hand pump, and the 2-quart and 1-gallon stored-pressure types are now available. Steady production of both the riveted and seamless drawn shell extinguishers is reducing the pent-up demand for the

soda-acid and foam types of fire fighters. Gas cartridge types for use with plain water or anti-freeze solution are also in production. Pump tanks are now available in both steel and polished copper, each in 2½ and 5-gallon sizes.

Fawick Service Manager

Returning after an 18-month period with the Russian Navy, Ernest J. Gottfried has been appointed to the post of Service Manager by the Fawick Airflex Co., Inc., Cleveland, Ohio.

Expect and get BLUE RIBBON PERFORMANCE From Improved PAVING FORMS



of more than 1,000,000 feet of Blaw-Knox paving forms which went to War.
Part of a stock pile of steel plates in the Blaw-Knox yards during the war period.

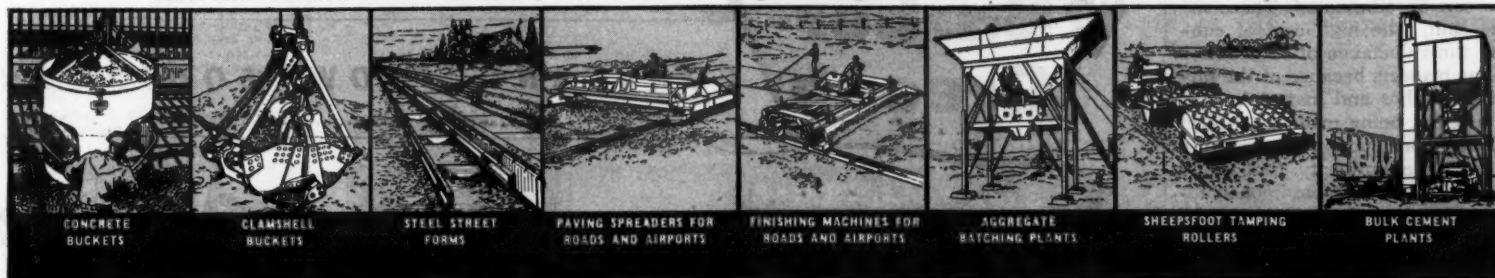
The choice of men who do high speed concrete paving of roads and airports, who appreciate the blue ribbon performance they get from the improved Blaw-Knox Self-Aligning Paving Form.

- It's the only self-aligning paving form on the market, and can be set faster and more accurately.
- Form alignment is undisturbed when stakes are set or if the stake has an obstruction.
- Less experienced form setters can be used.
- Improved reinforcement for rigidity and durability - husky ribs and no countersinking of holes in form plate.
- Available in 5 gage (7/32") or 1/4" special analysis open hearth steel plate.

Study the features of Blaw-Knox Paving Form. Learn all about them in Bulletin No. 2037 (we'll send you a copy) - know all the desirable factors that insure faster, better and cheaper form setting on your paving job.

BLAW-KNOX CONSTRUCTION EQUIPMENT

BLAW-KNOX DIVISION OF BLAW-KNOX CO., 2067 Farmers Bank Bldg., Pittsburgh, Pa. • New York • Chicago • Philadelphia • Birmingham • Washington



AASHO Discuss Plans For 1946 Road Work

Solution Sought to Problems Facing An Annual \$1,000,000,000 Program: Salaries, Shortages, Federal Aid, And Diversion Covered in Sessions

OVER 400 members of the American Association of State Highway Officials gathered for their 31st Annual Meeting at Oklahoma City, Okla., from January 29 to February 1 to discuss plans for the coming road-construction season, with particular emphasis on carrying out the provisions of the Federal-Aid Highway Act of 1944 which appropriated \$500,000,000 of Federal funds annually for three years to be matched by state funds. As this is the first year of the huge post-war program, the assembled delegates, representing forty-six states and the Federal Public Roads Administration, gave serious attention and study to ways and means of providing the best possible system of roads for the money that will be spent for that purpose.

Because of the great diminution in highway construction during the war years, with 1945 showing the least volume of work since 1912, the delegates were unable to contribute any outstanding papers covering new slants in road building. Instead, two general sessions of the meeting were given over to panel discussions of various phases of highway activities whereby all present were permitted to participate. With this mutual interchange of fact and opinion by officials from all parts of the country, valuable information was disseminated, and the general results achieved were considered greater for this immediate period than if papers had been read and commented upon in the usual way.

The registration included 417 members from every state except Maine and Nevada, with the greatest representation coming naturally from the host state, Oklahoma, with 64 delegates, followed by the Public Roads Administration with 39. In addition 212 non-members were present, including former highway officials, and representatives from manufacturers of construction equipment and material supply firms.

A little confusion arose in seating the Virginia delegation when it was discovered that no banner had been provided to mark the location in the huge Oklahoma City Municipal Auditorium for members from that state. C. S. Mullen, Chief Engineer of Virginia, assured the convention, however, that the Old Dominion State had not seceded from the AASHO, and seated his representatives near the West Virginia group.

Opening Session

At the opening morning session of the four-day meeting, Governor Robert S. Kerr of Oklahoma and Mayor Robert A. Hefner of Oklahoma City welcomed the convention which got under way with the address of its President, Herman A. MacDonald, Commissioner, Massachusetts Department of Public Works. According to Mr. MacDonald, 1946 will see the greatest highway construction program of all time if various obstacles can be eliminated. These include, he said, "the high cost of construction, the reluctance of contractors to bid large projects because of the uncertainties of labor and materials cost, and the attempt being made to subject the highway-construction program to control by some authority that could automatically stop highway construction or start it up, depending on the unemployment situation. These difficulties may delay our program somewhat at the start but I believe we can eventu-

ally overcome them and prosecute our program to a successful conclusion".

Mr. MacDonald revealed that the AASHO had appealed to Washington for the prompt discharge of engineers from military and naval service so that the lack of trained personnel would not hamper the construction program. He also advocated higher salaries for engineers and mentioned instances where laborers receive more compensation on

certain contracts than the engineers on the job.

At this session the 1944 past president Samuel C. Hadden, now a highway consultant in Indiana, was presented a testimonial in recognition of his services.

Federal Officials Talk

In the afternoon the convention was addressed by Major General Philip B.

Fleming, Federal Works Administrator. General Fleming drew attention to the mounting toll of highway accidents since V-J Day, and gave an outline of the plans and organization for the President's Highway Safety Conference which has been scheduled for May 8, 9, and 10 in Washington. The General cited the 1941 record of 37,000 fatalities from traffic accidents in this country,

(Continued on next page)

THE RUD-O-MATIC TAGLINE

Spring Tension—Less Wear

Maintains positive tension at all times sufficient to steady a clam shell bucket under any conditions. Functions perfectly with boom at any angle.

Operates on a spring principle. There are no weights, tracks, pins or carriages to wear out or get out of order. Large bearing and fewer sheaves save wear on cable.

Tagline is complete with fairlead and cable attached. Can be installed in less than one-half hour.

Most Crane Manufacturers have adopted Rud-o-Matics as standard equipment

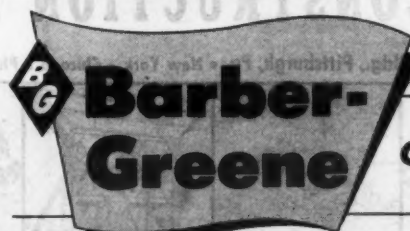


Why a **BG** Ditcher can cut through hard material

Just as a milling head steadily cuts through a piece of steel, so does the Barber-Greene Ditcher mill through tough materials. The closely spaced buckets, each taking small, even bites, travel at a high rate of speed, giving a milling action against the digging face. The vertical boom, exclusive with Barber-Greene Ditchers, causes the buckets and digging teeth to pull straight up against the work.

Frozen ground, coral rock, caliche—these are some of the hard materials through which Barber-Greene Ditchers have successfully and economically cut.

Catalog 44 describes and illustrates the many mechanical features and models of these versatile ditchers. Obtain a copy from your Barber-Greene distributor or write direct to Barber-Greene Company, Aurora, Illinois.



CONSTANT FLOW EQUIPMENT



LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

AASHO Discuss Plans For 1946 Road Work

(Continued from preceding page)

and stated that even in 1944, despite gasoline rationing, 24,000 people were killed on the streets and highways. In August, 1945, the month the war ended, he continued, the death toll immediately began rising, and in November it was 40 per cent over the same month in 1944. For greater safety, General Fleming urged higher standards of engineering in road construction, the standardization of driving regulations and road markings throughout the nation, rigid licensing programs, and other traffic safeguards.

Congressman J. W. Robinson of Utah, Chairman of the House Committee on Roads, also spoke at the afternoon session on the subject of highway legislation. The Congressman discussed aspects of the Federal-Aid Highway Act of 1944 wherein the various state highway departments have the responsibility of apportioning funds for all classes of projects in the state, such as the improvement of secondary roads and for highway projects in urban areas.

"Within each state," the Congressman declared, "there should be a coordination of the whole state highway program. There can be no better way of achieving this than through the chosen instrument of the state for highway construction. The size of the new program may tax the capacity of the highway departments; experience may prove that changes in state-local relations are necessary; but I am convinced that the principle of central state control is sound."

The veteran legislator also took a firm stand against various proposals to finance a national system of interstate highways by the collection of tolls, and concluded that the revenue gained from such collections would not only be insufficient but that the erection of toll gates would also seriously impair the utility of the system and generally increase costs.

The first-day session wound up with the presentation of the Association's newly created 25-year-service award of merit to member department personnel. A total of 473 certificates were awarded, with 99 going to the PRA, followed by Illinois with 22, Massachusetts with 21, until all but six states had been so recognized. Mary A. Riley of Massachusetts, secretary to the Commissioner, with 49 years in service, had the longest record.

Second Day

The second day's session was addressed by Thomas H. MacDonald, Commissioner of the Public Roads Administration, in which he praised the contractor's organization as an essential element in the highway industry. "It is

not possible," said Mr. MacDonald, "to emphasize too strongly the contribution to the velocity of our highway progress as a whole that must be credited to the highway contractors and their competent, highly skilled personnel."

Mr. MacDonald stated that a map is now available showing the proposed tentative routes of a main inter-city system of approximately 37,000 miles scheduled for immediate improvement. He also stressed the need for increasing salaries of highway personnel and told how "during the war period highway departments lost heavily of their best qualified engineering personnel. Some are returning, but many others will not return because of greater inducements elsewhere, particularly in private industry. Thus we find ourselves with a paradoxical situation, in which the public service cannot compete with private business for administrative and professional personnel, while it is recognized that the public service demands the best talent for effective administration."

At the Highway Officials luncheon,

L. S. Wescoat, Vice President, The Pure Oil Co. and Chairman of the American Petroleum Institute Committee on Highways, urged that diversion of gasoline-tax funds be effectively stopped. He also added that the results of planning surveys should be made available to the public to mobilize the needed support and cooperation for carrying forward the long range programs of improvements. Mr. Wescoat appealed to highway officials to help defeat laws placing narrow limits on truck weights and sizes which put trucks at a commercial disadvantage with other forms of land transportation. He asserted that the officials "can prove that raising weight and size limits within reasonable margins will not injure the road surface".

The afternoon session was given over to a panel discussion of administrative problems anticipated under the Federal-Aid Highway Act of 1944. A panel of six high-ranking officials conducted the discussion with contributions from the members.

Your RED CROSS must carry on!

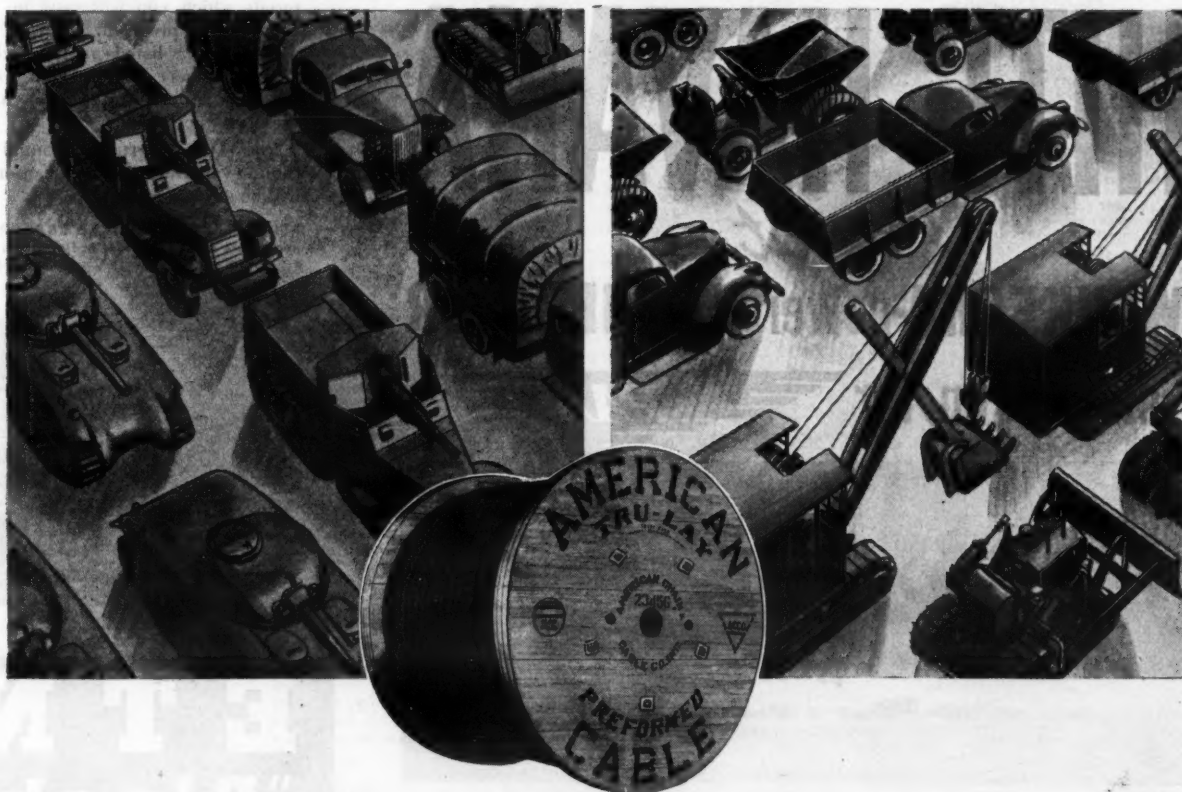


Final Business

Similar panel discussions marked the third day of the meeting, with the morning session covering the question of surplus property, and the afternoon session devoted to engineering problems anticipated under the Federal-Aid Highway Act of 1944. While these topics

(Concluded on next page)

a Plan for NOW!



3,000,000 jobs are now ready, thanks to the American Road Builders' Association. That organization sponsored a bill (now authorized by Congress) to provide one and one-half billion dollars of Federal money for road repair and new highway construction. To receive its share of these funds, each state must match its Federal request with a like amount of its own.

Here is a sound plan for putting returning veterans, and dislocated war workers to work on needed highway, bridge and airport construction. It will make work for millions more in durable and consumer goods industries. It will benefit all America by providing necessary facilities and helping stabilize our post-war economy. For full information regarding this vital plan get free copies of the illustrated booklets titled: "The Road Ahead" and "Put Your Town on the Air Map." Get them by dropping a card to the American Road Builders' Association, 1319 F Street, N.W., Washington, D. C.

Road Graders
Bulldozers
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Material Handling
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Use ANCHOR high pressure flexible oil hose assemblies on these hydraulically operated machines. ANCHOR assemblies are equipped with couplings unexcelled in design and performance. A ductile sleeve effects a permanent union of the coupling and the wire braids of the hose. This reinforced grip assures maximum hose life.

Consult ANCHOR on High, Medium, Low Pressure hose applications. Sizes 3/16" I.D. to 1 1/2" I.D. inclusive.

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In Business for Your Safety

**AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE**

AASHO Discuss Plans For 1946 Road Work

(Continued from preceding page)

were being reviewed, thirteen different committees were also meeting separately for the purpose of transacting committee business. These committees made their reports at the business session on the morning of the final day of the meeting at which time the following new officers were installed:

President, M. J. Hoffmann, Minnesota Commissioner of Highways; First Vice President, Judge C. W. Phillips, Tennessee Commissioner of Highways; Regional Vice Presidents, Spencer Miller, Jr., State Highway Commissioner of New Jersey; Harry B. Henderlite, Chief Engineer, Louisiana Department of Highways; W. W. Polk, Chief Highway Engineer of Illinois; and Ray H. Leavitt, Commissioner of the Utah Department of Engineering. G. H. Henderson, Principal Highway Engineer of the Rhode Island Division of Roads and Bridges,

continues as Treasurer. In addition, H. E. Sargent, Vermont Commissioner of Highways and Chief Engineer, and C. W. Brown, Chief Engineer of the Missouri State Highway Department, were reelected to serve on the Executive Committee. The Executive Secretary of the Association is Hal H. Hale of Washington, D. C.

Stronger, More Flexible Air Hose Born of War

War-born innovations in the processing of rubber hose has made possible superior peacetime products, the Good-year Tire & Rubber Co. has announced. Unusual strength and rope-like flexibility are said to feature its new Emerald Cord air hose. Made in light, medium, and heavy-duty weights, it is said to be oil-resistant and not affected by those lubricants which sometimes cause swelling and flaking in ordinary hose. It is non-porous and seamless.

Developed as a bullet-sealing hose

for fighting planes, the new product is made under a special method of bonding the cover carcass and tube for greater adhesion and strength than heretofore possible. This permits a thinner wall gage, increased ruggedness, flexibility, and long life, Good-year says. Another wartime develop-

ment used in the Emerald Cord air hose is that of cabled cotton yarn. This has great burst strength, less bulk, and is laid at an angle for greater resistance to shock blows.

Details on the Emerald Cord air hose may be secured by addressing the company at Akron, Ohio.

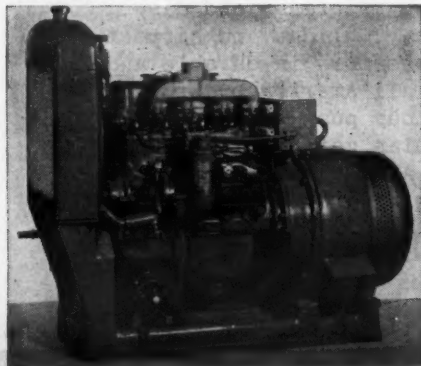
HURRICANE HITS HAVANA

...but

WAUKESHA-powered GENERATOR carries on for



"At three in the morning, with the wind at 70 miles per hour, the industrial power at the (Havana, Cuba) airport failed," reads the Oct. 8, 1945 report of Pan American World Airways, "and automatically the emergency Kohler generators went into action." (Powered by Model XAH Waukesha Engines these Kohler units are fully automatic, with remote control starting.) "Rain seeped through the smallest cracks . . . water finally inundated auxiliary Kohler near the hangar which supplied power to the receivers . . . kept the receivers in operation for two hours by the use of airplane batteries until the water was removed . . . The spark plugs were wiped off . . . the Kohler immediately went back into action, continued to furnish power for the radio station. It is believed that the only radios operating in Havana during those four days were the ones receiving power from our Kohler plants and because of this, it was possible to continue sending weather observations to the Division Forecasting Office in Miami."



Consult Waukesha Engineers about all your power needs.

Get Bulletin 1282.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., New York, Tulsa, Los Angeles

WAUKESHA ENGINES



★ BITUVIA Road Tar conforms to all standard State Highway specifications, and can be used to advantage on most every type of road, highway and airport construction and maintenance project.

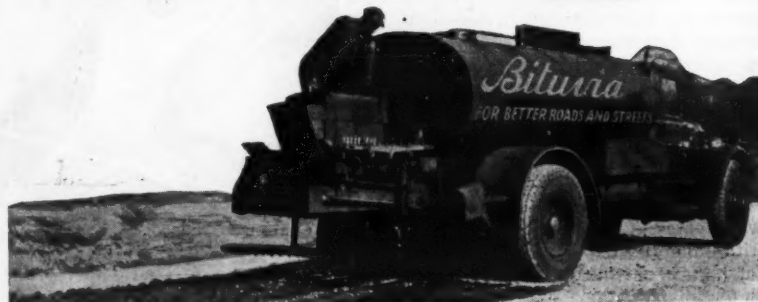
REILLY also produces other materials which you will need in your construction program. A few of these materials are listed at the right. A Reilly engineer will be glad to give you complete information on any of these products.

Pocket-size BITUVIA manual containing valuable road construction data will be sent on request.

REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg. • Indianapolis 4, Ind.
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OTHER REILLY CONSTRUCTION MATERIALS . . .

- PLASTUVIA Crack & Joint Filler
- Creosoted Guard Rails and Posts
- Creosoted Bridge Timbers
- Creosoted Piling
- Bridge Paint
- Traffic Line Paint
- Concrete Curing Compound
- Wood Preservatives
- Pipe Enamel and Primer



ETNYRE "Black-Topper"

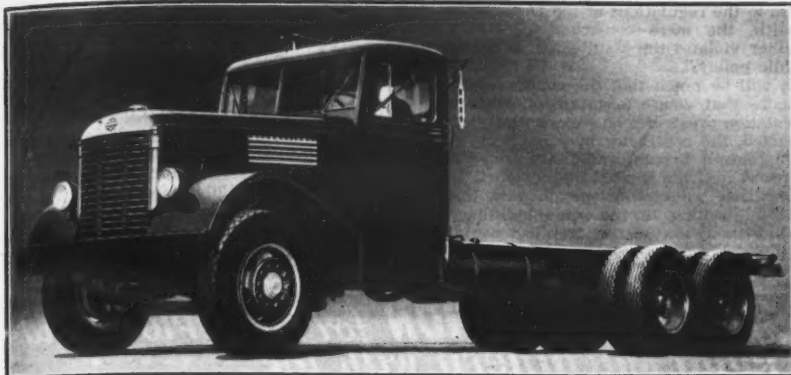
BITUMINOUS DISTRIBUTORS

for DEPENDABILITY



Over 40 years of research accentuated by numerous Army contracts . . . quality construction methods and materials . . . assure top-notch dependable performance with Etnyre Black-Toppers. Get full details from your Etnyre dealer or write direct.

E. D. ETNYRE & CO., Oregon, Illinois



The new International Western Freighter highway transport model W-4064-H is a 6 x 4 or 6-wheel vehicle with a tandem-drive rear axle and a gross vehicle weight of 40,000 pounds.

Heavy Trucks Built For Western Needs

A new line of International trucks, designed especially for the extra-heavy requirements of the western states, has been introduced at showings throughout the eleven-state Pacific area. Built at the Emeryville, Calif., plant recently acquired by the International Harvester Co., the line comprises two Western Freighter highway trucks having gross-vehicle-weight ratings of 30,000 and 40,000 pounds, and four off-the-road units with ratings of 40,000, 45,000, 65,000, and 90,000 pounds.

The two highway trucks are a four-wheel vehicle with the drive on the two rear wheels, and a six-wheel unit which has the power applied to the four rear wheels. Western Freighters are available with an International-Continental S-6749 gasoline engine, a Hall-Scott HS-400 gasoline engine, or a Cummins HB-600, NHB-600, or NHBS-600 supercharged diesel engine, as desired.

Clutches of the two-plate type feature the engines, those on the NHBS-600 and the HS-400 having 15½-inch diameters, the others 14-inch. A selection of Spicer heavy-duty transmissions of both the four and five-speed types is available. Timken axles are used throughout, and front and rear air brakes are supplied. The trucks have a three-man cab, rubber-cushioned against noise, in which the latest developments for comfort and convenience are installed.

Full details on the new Western Freighter line may be obtained from the Motor Truck Division of the International Harvester Co., 180 No. Michigan Ave., Chicago 1, Ill. Mention this report when writing.

Urges Ball and Roller Bearing Standardization

The standardization of the sizes of ball and roller bearings is being urged in an appeal to the nation's motor and machine manufacturers. Such standardization would reduce overall costs, speed delivery of bearings to prime reconversion centers, aid young industries, and broaden American participation in world reconstruction. S. F. Wollmar, Executive Vice President of SKF Industries, Inc., asserts.

Pointing out that bearing manufacturers are now required to produce and stock as many as 40,000 sizes and makes of anti-friction bearings, Mr. Wollmar

claims that "some of these products differ from others by the merest hair's breadth". If a uniform system of basic sizes were adopted, it would be possible to limit production needs to 2,000 sizes without sacrificing bearing quality, he says.

Macwhyte Golden Jubilee

The golden jubilee of its foundation is being celebrated this year by the Macwhyte Co., wire-rope manufacturer of Kenosha, Wis. The firm was incorporated with a capital of \$2,500 in Illinois in 1896 as the Leschen-Macomber-Whyte Co. Located first in Illinois, with its major plant at Coal City, the organization moved to Wisconsin in 1912. The present name was assumed in 1920. The late George S. Whyte, one of the founders, was actively identified with the firm for many years as President and Chairman of the Board. His son, Jessel S. Whyte, is the present head of the business.

After All These Years!

The completion of construction on a road in the Canary Islands, on which work was started 36 years ago, has made possible automobile travel between San Sebastian and Vallehermoso, Gomera Island. The project was be-

gun in 1909, but work almost completely ceased for 10 years. Active construction has been maintained since 1919, the elapsed time being used to engineer the highway over volcanic mountains and deep ravines.

Towns and villages connected by the 27½-mile route depended on mule paths until now. The road is metaled, not asphalted, and has an average width of almost 20 feet. Local materials were used, except for cement from Spain and lime from the neighboring island of Fuerteventura.

Clamshell Bucket Data

Digging-type clamshell buckets of the Class K-6 style are described in a folder available from the Hayward Co., 32-36 Dey St., New York 7, N. Y. The buckets are made in standard sizes ranging from ¾-cubic-yard to 2-cubic-yard capacity. Special buckets of this type can be built to suit the needs of the user and the machine used. The folder, Bulletin 680, may be secured from the company.

- Let the Record Speak!

Clark Bros.
 SUBJECT: TORQUE CONVERTER TRACTOR
 OWNER: CLARK BROS. CONSTRUCTION CO., Hinton, Iowa

PURCHASED
 JULY, 1941

AUGUST 20, 1943.
 Only a partial overhaul
 after 6,100 HOURS
 OF OPERATION.

MARCH 24, 1945.
 First Complete Overhaul.
 after 14,000 HOURS
 OF OPERATION.

Owner's opinion at this time--
 "The Torque Converter is wonderful. It's easy on the tractor--operation is smooth, no jerking. Original master clutch is still on the tractor --in fact, we've never even taken up on the clutch!"

Said the owner then--"I am most pleased with the service record of the Allis-Chalmers Torque Converter Tractor. Besides, it has moved more yardage than any of my other tractors."

Operating the Gar Wood 515 cable scraper, Clark's Torque Converter tractor packs in bigger loads, moves them faster, smoother, with less operator effort . . . reduces maintenance cost of entire outfit.

Here's how the HD-14C Torque Converter tractor looks today . . . streamlined to the minute in appearance and performance.

"NOT SO TIRED AFTER A DAY'S OPERATION"
Says Operator
 Sioux City, Iowa
 November 13, 1945
 "I have operated this Allis-Chalmers HD-14C Tractor for over four years for Mr. Clark of the Clark Construction Company, Hinton, Iowa, and will say that the Torque Converter has it all over the gear type tractors. It has much smoother power and does more work. It is a lot easier to operate than the old tractor."
 "I do not feel as tired at night after operating this tractor without all of that gear shifting."
Earl King, Operator



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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Failure to Put Contract In Writing Was Costly

Somewhere in Shakespeare there is a suggestion that the first thing that should be done is to kill off all the lawyers. For the benefit of those who have the same blood-thirsty disposition, let us suggest that a good many lawyers could be starved to death if laymen were to exercise more wisdom in their business dealings. When laymen cease blundering, lawyers will either starve or have to choose another vocation. In the meantime, as Pope put it long ago, if two chaps get into a squabble over an oyster they must expect to have to divide the shell in the wind-up, while the men of the Law eat the meat.

In the "feuding" section of Kentucky, a coal company hired a contractor to furnish the labor required to construct a stone building on a cubic-measurement basis. Only 1,331 cubic feet were involved, but the parties are still litigating the question as to how much the contractor is entitled to, after their lawsuit has been tried in one court and reviewed on appeal in another, which has sent the case back to the first court for a new trial. There would have been no need for intervention of courts and lawyers if the parties had set down in writing how much the contractor was to receive for his work. There was an oral agreement, but the contractor insists that he was to be paid \$1.50 per cubic foot, while the coal company insists that the agreement was for payment of \$13.50 per cubic yard.

In suing, the contractor relied upon a claim that there was an explicit agreement as to what he was to receive. (Had he claimed that there was no agreement, he would have been entitled to collect the reasonable value of the work done.) At the trial the one vital question was: Did the parties agree on \$1.50 per foot or \$13.50 per yard? On that point, there was a hopeless conflict of testimony. But it did appear that the prevailing price for such work in the community was from \$8 to \$12 per yard, and that the company had turned down a bid of \$14.

A jury upheld the contractor's version and allowed him recovery on the basis of \$1.50 per foot (\$40.50 per yard). But the award was reversed on appeal to the Kentucky Court of Appeals. The gist of the higher court's decision is: (1) Proof that the company had turned down a bid of \$14 per yard and that a reasonable price was from \$8 to \$12 should be considered as tending to corroborate the company's version of the agreement. (2) The trial judge should have told the jury that if the parties had not agreed on a specific price, the contractor should be awarded what was a reasonable price for the work. (Meem Haskins Coal Corp., defendant-appellant, v. Pratt, plaintiffs-appellees, 187 S. W. 2d, 435.)

In passing, it is interesting to reflect that the dispute in the Kentucky case may have arisen in this way: The company may have agreed to pay \$13.50 per yard and the contractor may have hastily assumed that that would be the equivalent of nine feet at \$1.50, overlooking that it takes 27 cubic feet to make a cubic yard. It seems to be more than a mere coincidence that nine times \$1.50 equals \$13.50.

Statutory Specifications And Private Contracts

A very close legal question was recently passed upon by the Superior Court of Pennsylvania, an intermediate appellate court. The decision favored contractors, but should not be relied upon as meaning that in no case may a contractor ignore statutory specifications not specifically made a part of his contract.

The plaintiff in the case, a general contractor, agreed to construct a swimming pool at the defendant's summer camp for children. The work was to be done "in a first-class workmanlike manner and of the highest grade and quality of material". There were no plans or specifications, except a meager rough pencil draft made by the contractor. A year after the work was done, the defendant-owner expressed complete satisfaction with the job. But when the Department of Health refused to issue a permit for operation of the pool under the Pennsylvania Public Bathing Law, because the pool did not conform to rules that had been adopted by the Department under that Law, the owner refused to pay a balance due on the contract. The contractor sued, and was awarded a judgement which the Superior Court upheld. Said that court, in part (Menelce v. Camp Kadimah Co., 43 Atl. 2d, 621):

"We agree with the court below that the Public Bathing Law was not impliedly incorporated into the contract. The construction of a swimming pool is a matter of pri-

vate contract and whether or not the statute becomes a part of the contract is a matter of the intention of the parties. Plaintiff denies that he agreed to build the pool according to regulations of the Department of Health. Many construction contracts are subdivided; a single contract does not necessarily contemplate the completed project. The agreement of the plaintiff to build the pool does not necessarily imply that he agreed to make the minor changes or corrections required to operate it as a public pool. The plaintiff constructed the pool in full compliance with the contract and the work was accepted and approved. This was a performance of the contract between the parties. The equipment of the pool as a public swimming pool is another and separate matter, having no effect on the contract as executed. The statute in question was intended to regulate and govern the person for whom the pool is built. . . . While it may be illegal to operate a public swimming pool that does not con-

form to the regulations of the Department of Health, the mere construction of a pool neither violates the statute nor is it against public policy."

It will be noted that the court clearly intimates that where a statute or other legal regulation prescribes how work shall be constructed, the contractor may impliedly obligate himself to conform to those specifications. A decision is cited by the court, to the effect that where construction of a theater and a dwelling in the same building was forbidden by statute, an architect could not

collect a fee for planning such a building. (Medorff v. Fisher, 257 Pa. 126, 101 Atl. 471.)

Terms of Sales Contract Affect Attorneys' Fees

It is generally recognized by the courts that a conditional-sale contract between private parties for a sale of equipment or other chattels validly may provide for the assessment of an attorney's fee against the

(Concluded on next page)

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Avoid Legal Pitfalls

(Continued from preceding page)

buyer if the seller resorts to suit to collect on the buyer for being in default in payments. In some states the validity of such provisions, or the amount of the fee that may be provided for, may depend upon special statutory provision.

However, in the case of a conditional-sale purchase made by a public authority it is doubtful that a clause for assessment of an attorney's fee is enforceable unless specially sanctioned in the charter or statutory authority under which the particular contract is entered into. In a recent Tennessee case, involving the liability of a county on a conditional-sale contract entered into by its Superintendent of Roads, in purchasing road equipment, the state Court of Appeals, Eastern Section, decided that an attorney's fee was not allowable under the contract. The court said: "We are not able to find any authority for obligating the county for this expense and none is cited by diligent and able counsel." (Carter County v. Williams, 190 S. W. 2d, 311.)

the policy did not cover the accident, saying, in part:

"The obvious undertaking of the policy . . . was to insure against the normal hazards of a business engaged in selling and handling building materials, and did not include the operation of a storage yard for other purposes and the loading of a shovel boom for transportation to another operation which was not connected with . . . the selling or handling of building materials. That the risk was no greater than that insured against is immaterial when the frequency of the risk might have been a determining factor in the fixing of rates, assuming that even that consideration would affect the case. What is important is that the contract fixes the obligation of the parties, and it cannot be enlarged upon except by an additional contract or some act or estoppel, neither of which appears here. . . . The payment of the employee's wages as if for operations covered by the policy could not have the effect of changing . . . the policy when the insurance company did not receive the premiums with such notice."

Unconstitutional Tax On Contract Bidding

One reading court decisions is apt to sense that lawsuits often appear to have rested upon thin air rather than upon any plausible foundation. To our mind, a group of twenty-four cases lately decided by the Florida Supreme Court falls within that category. It seems to us that even a school kid would have sensed that a defense set up by the State Comptroller of Florida against tax refund claims was unsound. But it took a decision of the Supreme Court of the state to convince that official.

In 1935 the Legislature enacted a law, imposing an annual tax of \$1,000 upon those engaged in bidding on public works contracts involving more than \$50,000. Many contractors paid the tax before the Supreme Court decided in 1939, that the law was unconstitutional because its title did not conform to constitutional requirements, and also because its provisions were unreasonable. In 1941, the Legislature approved a revision of all the general statutes of the state, erroneously including the 1935 law. In 1943, the Legislature enacted a provision for refund of illegally assessed taxes. In 1944 many contractors who had paid taxes under the 1935 law sued to compel refunds. The Comptroller insisted that the license tax law was revived by the 1941 statutory revision, and that the contractors could not secure refunds on taxes paid in previous years without paying taxes for 1942 and succeeding years.

Of course, the Supreme Court decided that since the Legislature's enactment of the license tax law in 1935 had been held to be unconstitutional, because unreasonable, the Legislature could not revive it by later including it in a compilation of the general laws of the state. In short, the revision of the statutes could validate the 1935 law, so far as it was unconstitutional because of a defect in the title, since the revision was constitutional without the inclusion of a formal title separately covering the license tax provisions; but the provisions of the license tax statute did not become reasonable through mere reenactment as part of a revision of all of the general statutes of the state.

The Supreme Court reaffirmed what it had said in its original decision, in denouncing the tax law as being void for unreasonableness: "To require the payment of a fee for the mere purpose of bidding would be arbitrary and unreasonable and to exact the fee of those only who were successful bidders would write something into the Act that the Legislature expressed no purpose of doing. Not only that but it would in effect defeat other requirements of the law providing that public contracts be let to the lowest . . . bidder as the exaction imposes an unreasonable burden." (State v. Lee, 22 So. 2d, 804.)

Insurance Covers Only Occupation Designated

Those engaged in the dual business of selling road materials and of road construction will be especially interested in a case decided by the Georgia Court of Appeals. (United States Fidelity & Guaranty Co. v. Stubbs, 26 S. E. 2d, 168.)

Stubbs was employed by a construction company which carried workmen's compensation insurance in the surety company as a "building material" dealer, covering a concrete-mixing plant operated by the construction company. Stubbs was employed as a crane operator at the mixing plant, but was injured in a storage yard two miles away, while assisting in loading a shovel boom for use by the company under a road-construction contract. The court decided that

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Army Engineers' Role In Future Road Work

Valuable Research Data From War Seen as Boon to Industry; Corps Carrying on Widespread Studies; Wheeler Outlines Aims, Policies

THE fact that we could build roads faster and better than our Axis enemies contributed greatly to our victory in a war that required the greatest road-building jobs in history, Lieutenant General Raymond A. Wheeler, Chief of Army Engineers, declared at the recent Annual Meeting of the American Road Builders' Association in Chicago. In answer to the question, "Where do we go from here?", the General said that his command has three contributions to make in the future development of the American construction and engineering fields.

The first of these is the reassurance that the Engineers intend to manage the disposition of their equipment inventories to the end "that the American construction and construction-equipment industries will lead the way in creating a more prosperous post-war America", he stated. Though "not completely free agents" in managing surplus disposal, the Corps recognizes that the existence of such huge stores of equipment places on all agencies concerned a very great responsibility insofar as the future of America's construction is concerned.

While the program of future military construction cannot yet be discussed in detail, the recently passed Deficiency Bill assigning the Corps a peacetime flood-control and rivers and harbors program "considerably larger than our normal pre-war civil works", was cited by General Wheeler as the second contribution. Substantial road building and highway work will be included in the initial program of \$125,000,000, and in the regular flood-control and navigation improvement measures to be introduced, he promised, since nearly all major reservoir projects involve some relocations. "Placed where our studies indicated the need to be greatest, these projects nevertheless are well distributed throughout the country, and we expect work on all of them to be under way as soon as the weather will per-

mit," the General said.

Valuable Research Data

The third and most important contribution which the Corps of Engineers can make in shaping the future of American road building lies in the vast experience and knowledge secured under stress of war, the General asserted. He based his prediction on the mass of extremely valuable technical data now on hand, and on studies being carried on by the Corps.

Ranging from equipment maintenance and performance to bridge and pavement design, means of rapid soil analysis, hasty repair methods, and the training of operators, the data collected during the war are still in the process of being assembled. Because of the scope of these investigations and their potential influence on road design and methods of construction, the Corps will be busy for a long time to come drawing conclusions which will adequately express its findings, General Wheeler said.

The design of equipment and bridging for Engineer troops, with special emphasis on earth-moving and heavy construction equipment, is being studied by the Research and Development Division and its operating agency, the Engineer Board.

Interesting and significant progress has been made in modifying heavy equipment for air transport, General Wheeler reported. Wartime advances were also made in the protection of equipment against extremes of climate, the design of bridging, the development of highly portable work equipment, maintenance shops and trailer transport, and in other fields that have civilian applications.

A series of studies of tremendous potential importance is going on under the Engineering Division of the Corps' Civil Works program. These include research in porous concrete, and its use for drainage relief and the reduction of uplift under solid concrete pavements, etc.; slope protection, and the comparative advantages of riprap, concrete

slabs, bituminous paving, porous concrete, and sodding; and the most economical design for reinforced-concrete conduits. Basic studies are also being made in the properties of concrete, air entrainment, the effects of freezing and thawing, aggregates, etc.

Special emphasis is given by General Wheeler to the work being done in soil mechanics. Started long before the war in connection with flood-control structures, this research proved invaluable in overcoming many war problems. The principal center of study is at the Waterways Experiment Station, Vicksburg, Miss.

"Foremost Airfield Builders"

Though concerned primarily with airfield construction problems, the studies being carried on by the Military Construction and Operations section of the Engineer Corps are of interest to road builders. Extensive research has to be maintained in this field to keep abreast of the strides made in airplane

(Concluded on next page, Col. 4)

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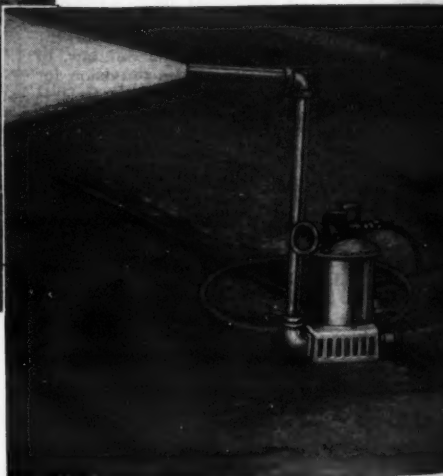


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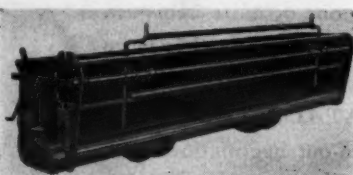


↑ **REMOVAL OR APPLICATION** of nuts and bolts by CP 365-RP (impact type) Wrenches is performed in a fraction of the time required by hand wrenches. Capacity of the 365-RP, 1 1/4" bolt size. Five other models handle bolts, nuts, from 3/8" to 1 3/4" bolt size.

LIGHT in weight, fast, and easy to handle, Chicago Pneumatic Clay Diggers are ideal for digging in clay, shale, etc. For general digging in soft to medium hard clay the lighter CP-3 is recommended. For digging in hard clay, shale, etc., there's nothing faster or better than the CP-5.



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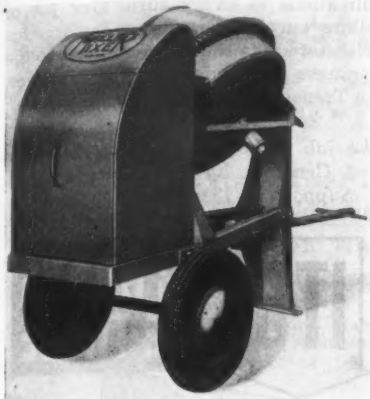
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A new 3-S tilting concrete mixer having a capacity of 3 cubic feet has been introduced by the Muller Machinery Co., Inc., of Metuchen, N. J. The machine can be furnished with steel

wheels, or with pneumatic-tired wheels that have Timken bearings. It is powered by a Briggs & Stratton engine, and has an all-steel drum bowl and a telescoping towing bail.

Readers interested in a more complete description of this new mixer may obtain a bulletin, on mention of this notice, direct from the company.

Three-Fold Testing Service Described in Lab Brochure

The three-fold laboratory testing services offered by the Pittsburgh Testing Laboratory are interpreted and illustrated in a brochure offered by that organization. One PTL service comprises the testing of materials, including research into the nature of substances as well as routine physical and chemical analyses. Another function of the organization is field inspection and testing, which includes the checking of quality, quantity, and specifications of materials for those buying from outside sources. This also covers the in-

spection of engineering projects, buildings, and materials during construction. The third service offered by PTL is that of product performance testing to determine how well designs and materials fulfill the requirements of intended service.

Pittsburgh Testing Laboratory maintains district branches and laboratories in 16 industrial centers across the nation. It has associates in other U. S. cities, in Canada, and in London, England. Copies of the brochure may be obtained by readers of CONTRACTORS AND ENGINEERS MONTHLY on request. Just mention this review when writing the Pittsburgh Testing Laboratory, Stevenson & Locust Sts., Pittsburgh, Pa.

New ARBA Director

Rufus C. Phillips, Jr., President of Airways Engineering Consultants, Inc., of Washington, D. C., has become a member of the Board of Directors of the Airport Division of the American Road Builders' Association.

Army Engineers' Role In Future Road Work

(Continued from preceding page)

construction. As a result of these studies and their wartime duties, the Army Engineers are now the world's foremost airfield builders.

The Corps maintains a Flexible Pavement Laboratory at Mariemont, Ohio, and a Frost Effects Laboratory at Boston, as part of its airfield program. Specific research projects are carried on from time to time in various divisions and districts, and the Engineers are aided in their work by the Board of Consultants for Airfield Pavements, which comprises most of the nation's leading authorities in the field.

Data secured from its airfield pavement investigation projects are circulated to all field offices of the Corps as criteria for further design and construction. Detailed reports are furnished other government departments, and design manuals are filed with the library of the American Society of Civil Engineers in New York, and at the Library of Congress.

Soil Studies

Research in the trafficability of soils, begun during the war, is being continued, according to General Wheeler. An extended and complete study of the passage of tracked or wheeled vehicles over undisturbed soils in various terrains—a field never before investigated with any thoroughness—is being prosecuted. An instrument for registering the bearing values of undisturbed soils, the "cone penetrometer", was developed by the Corps as the war ended.

Satisfactory airfield-pavement design criteria for wheel loads up to 150,000 pounds have been derived from other investigations, the Chief reported in conclusion. Study is being continued on such problems as water repellents, anti-stripping admixtures, frost and moisture effects, soil compaction, subsurface drainage, overlays, and others, all of which are directly applicable to highway work.

One-Man Hand Truck

Useful around the maintenance department shop for carrying oil drums, barrels, kegs, sacks, and other items, as well as for handling bag cement or drums on construction jobs, a new utility hand truck has been announced by the Schmidgall Mfg. Co. Known as the Handy, this truck has a 500-pound capacity, with a large overload limit. Handled by one man, it is especially adaptable for operation in narrow places and close quarters.

The Handy is built of welded steel. It has a single handle, a 14 x 9-inch steel carrying platform, and its frame is of sturdy channel iron. The wheels, which carry the load in the balanced design, have bronze bearings and molded rubber tires.

Further information on the Handy truck may be secured by addressing the Schmidgall Mfg. Co., 307 Cass St., Peoria 2, Ill., and referring to CONTRACTORS AND ENGINEERS MONTHLY.

Johns-Manville Officers

The election of L. M. Cassidy and T. K. Mial as Vice Presidents, and the retirement of L. R. Hoff as Vice President in charge of sales, have been announced by the Johns-Manville Corp., New York City. Both new officials are executives in subsidiary firms. Mr. Cassidy will direct J-M sales, and Mr. Mial a long-range development program. Retiring after 35 years as director of sales activities, Mr. Hoff will continue to serve J-M as consultant on trade association matters.

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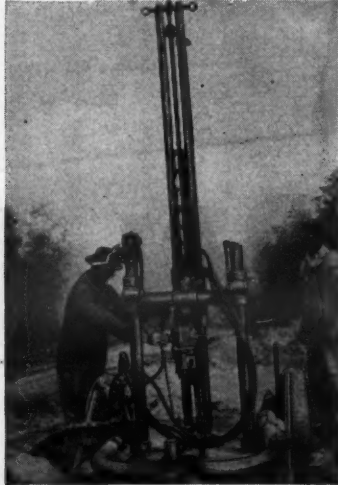
↑ SPEEDING demolition work of all kinds, CP Demolition Tools operate with smooth efficiency and minimum kick-back. They are time and money savers for contractors. ↓ Sizes range from 25 to 82 lbs.

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← THERE ARE many jobs that call for the light weight G-200 R Wagon Drill to provide one-man operation and faster drilling with the more powerful CP Drifter Drills. G-200 R is readily moved about, easily accommodates 6 foot steel changes; and handles up to 24-foot steels.



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Problems and Policies Of Surplus Disposal

"In principle, the Surplus Property Act directs us to place the national welfare above that of individual groups", John S. Cooke, Vice President of the Consumers Goods Division of the War Assets Corp., told the recent meeting of the Associated Equipment Distributors at Chicago. In describing the program aiming at an early and fair disposal of surplus equipment, Mr. Cooke said:

"In order to conform with the Act we must, for example, avoid promoting monopoly or windfall profits. We must see that Federal, state, and local governments, and veterans are placed in preferred positions to purchase, and that small business has an equal chance to buy. We must plan disposals which will avoid unemployment or retard production. We must foster wide distribution to consumers at equitable prices.

"Generally speaking, we sell wherever possible through normal channels

of trade, that is, the outlets customary to a particular type of merchandise. These are defined not only as established enterprises but also new businesses which can show that they are set up in conformance with normal trade practices and expect to continue in the same line. . . . In the construction field only dealers participate. We do not usually sell to the ultimate consumer . . .

"In construction and farm machinery, and automotive parts and vehicles, our obligations and objectives are the same as elsewhere, but our disposal methods are somewhat different. Merchandise in the first two categories is typically sold by the synchronized spot sale . . .

"In general our policy will be to allow our regional offices greater authority and responsibility in disposal, by developing a system of centralized administrative controls which will allow responsible officials in the regional offices considerable latitude of judgement, and place on them a much greater responsibility for the promotion and planning of sales than has heretofore been the

case.

"We will maintain our policy of selling wherever possible under customary business practices. We are now in the process of planning to extend credit over a wider range of goods than heretofore. All programs will continue to be accompanied by carefully worked out advertising and merchandising plans in order to encourage the widest possible distribution . . ."

"It is up to us to see that this [construction] machinery and equipment gets to the place where it will do the most good in the shortest possible time. To meet this obligation we have agreed to combine with the Producers and Capital Goods Division of RFC to hold sales at the various military depots where the merchandise is located. These sales will stress quick disposal and will include not only the declared but the undeclared surplus. . . .

"We are part of a very large and complicated governmental organization dealing in a large and complicated problem. We meet involved laws and

obligations at every turn. Our job of selling surplus has many facets. Our obligation is to the entire nation: to the Congress, the consumer, the taxpayer, the Treasury, and to the business man."

The job to be done by the American Red Cross is by no means finished. Support its 1946 drive for funds.

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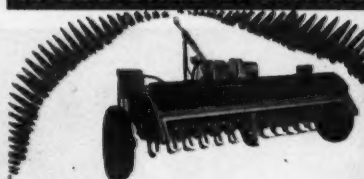
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Ariens AGGMIXER is equipment especially designed for use wherever aggregates are used, such as all types of bitumens, cements, chlorides, clays, etc., operating in connection with other general purpose road equipment, and does the job thoroughly, rapidly and economically, without displacing the materials on the road surface. It thoroughly pulverizes, mixes and aerates, regardless of the binder used.

Ariens AGGMIXER is that equipment designed for mixed-in-place construction, and is safe and easy to operate. Adjustable to any tractor. Made in 4 sizes with normal cutting widths 4', 5', 6' and 7'.

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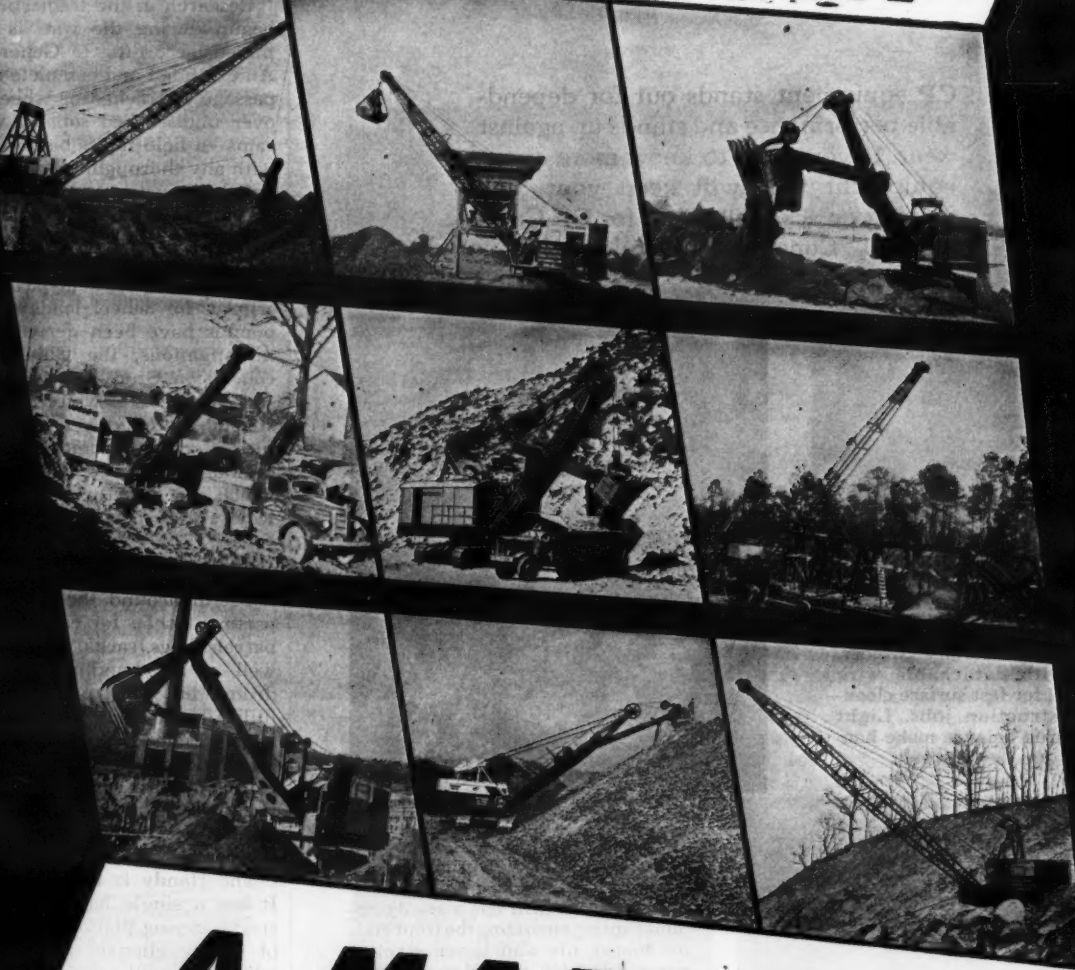
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Southwestern States' County-Road Problem

Wide Variety of Terrain And Climate, With Sparsely Settled Areas, Lessen Need For High-Type Surfacing

By W. C. PETERSON, Division Maintenance Engineer, Public Roads Administration, Fort Worth, Texas

IN a discussion of the maintenance practices employed by the various counties and parishes of the states of Arkansas, Louisiana, Oklahoma, and Texas, which together comprise Division 6 of the Public Roads Administration, attention is directed at once to the wide variation in climatic and topographical conditions encountered, ranging from the semi-arid high-plateau areas of northwestern Oklahoma and Texas to the alluvial plains along the Mississippi and other rivers in Arkansas and Louisiana and the coastal-plain areas along the Gulf of Mexico in Louisiana and Texas.

In eastern Oklahoma, northeastern Arkansas, and western Texas, rough country approaching the mountainous is encountered. In the northeastern part of Oklahoma and Texas, highway maintenance men have droughts and extremes of heat and cold with which to contend. Along the coastal plains, hurricanes and sudden tropical storms inundate and devastate the highways. In the central and eastern section of this area, periodic spring floods add to the maintenance man's woes.

A large portion of this area, particularly in western Texas and Oklahoma, is devoted to ranching and dry farming. The country is sparsely settled and, in general, there is no traffic need for high-type pavements. Fortunately, in many localities in this area, deposits of caliche and gravel or coarse sand occur and are used for surfacing and base-course material. In Texas and Oklahoma, there are rock-asphalt deposits, and this material is used extensively in the construction of higher-type pavements.

In eastern Texas and in Louisiana and Arkansas are found more of the clay soils which are difficult to manipulate, and most of the county roads in these areas are graveled. With the exception of some of the more densely populated counties of Texas and Oklahoma where traffic is heavy enough to justify the expenditure, very few of the county roads are surfaced with high-type pavement. Surfacing usually consists of a light base course of caliche or gravel.

In general, the majority of county roads are of gravel or earth types, and the maintenance operations consist principally of blading or dragging the road after local showers, the mowing of weeds, and the repairing of bridges and culverts. This last operation constitutes a major portion of the maintenance work, as most county bridges are of timber construction using both treated and untreated lumber. Many of these structures present definite traffic hazards due to their narrow roadways and to the advanced deterioration of the structures themselves.

The wartime increase in allowable truck loadings hastened the deterioration of many miles of high-type wearing surfaces and bridging on county roads in and around the large cities and has thereby thrown an increased burden on the maintenance organizations of the various counties affected. The war effort required practically the entire output of road-maintenance equipment manufactured during the war years. This fact, together with the scarcity of replacement parts and tires, severely taxed the maintenance-equipment facilities of the various counties. As a consequence of this enforced curtailment, maintenance, in general, was limited to those roads serving the activities essential to the continuous movement of war traffic, and incidental work on shoulders, slopes, etc., has been neglected in order to keep essential traffic moving and to provide maintenance on county roads to facilitate the transportation of farm produce to town.

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County-Road Organization

Let us briefly digress here to explain how the various county maintenance organizations are set up in the four states which comprise Division 6. In Arkansas, with an area of 52,725 square miles, the state is divided into 75 counties, each of which has a road-

maintenance organization under the direct supervision of the County Judge, who handles the purchase of equipment and has direct supervision of all road-maintenance work in his county, including control of the personnel used on road work throughout the county.

Louisiana, which has an area of 45,177 square miles, is divided into 64 parishes (corresponding to counties of other states), each of which is divided

into from three to twelve or more wards, depending on its size and population. Each ward has what are known as members of the Police Jury, and a ward may have one or more members or Police Jurors, depending on the population. These Police Jurors hold an annual election among themselves and elect a president in each parish and usually a full-time secretary. About

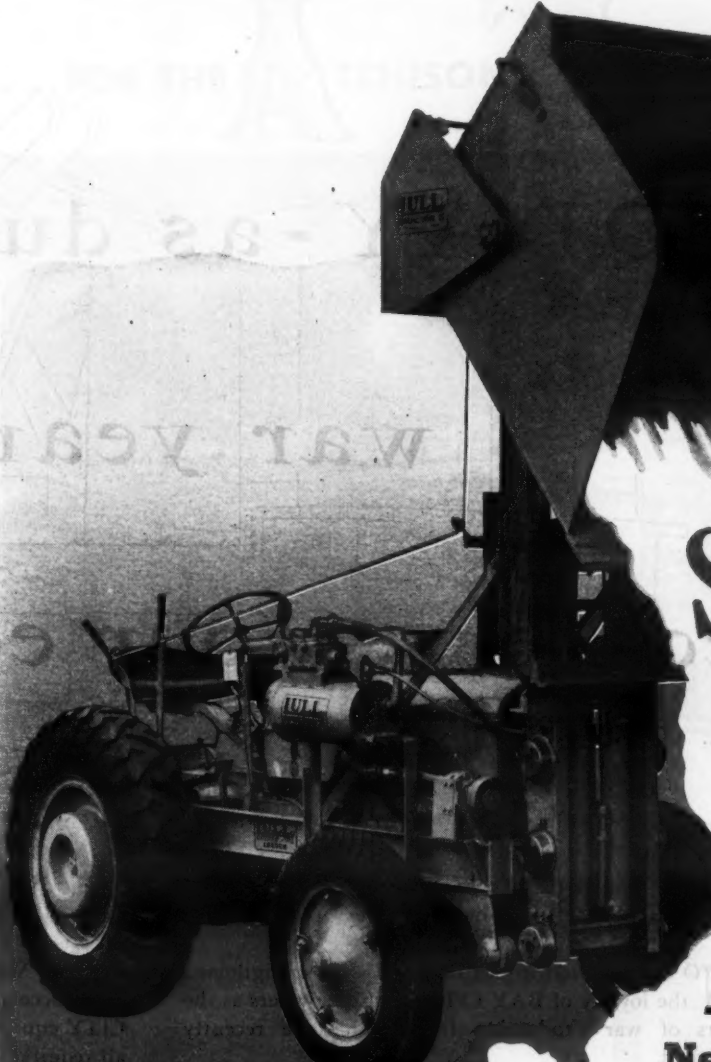
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The stability and extra strength of Case tractors make them a "natural" for high hoists and heavy lifts. The velvet action of their heavy-duty clutches permits swift, smooth scooping or "inching" to precise placement. The "lugging" ability of Case engines, whereby they pull as strong at half-speed as when wide open, gives "steam-like" throttle control of speed both in hoisting and in hauling.

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Southwestern States' County-Road Problem

(Continued from preceding page)

maintenance work at the salary (usually set by state law) that can be paid.

Finances a Limiting Factor

A discussion of the present existing county organizations then resolves itself around the problem of how best to maintain county roads from the revenues which will be available in the post-war years. In the first place, before any road can be satisfactorily maintained, it must be properly built. This means that a road should be designed by a competent engineer who will take into account proper grades, drainage, and other features which will insure a satisfactory future road with the expenditure of the minimum amount of money on maintenance.

Although it is true that the revenues for road construction and maintenance in the various counties and parishes are limited, it appears that the plans of counties to organize their road-maintenance activities to provide the highway services which faster-moving traffic now demands will accomplish a great deal. Some counties are placing road maintenance under one centralized engineering authority who can assign maintenance equipment where most effective repairs can be made, following the old adage that "a stitch in time saves nine". Reduced maintenance expenditures will also result from road-improvement programs based on allocations of county funds to those roads serving the most traffic and from engineering design which will provide more durable roads.

Servicing Equipment

These counties eventually plan to build a centrally located warehouse and as many additional branch warehouses as may be necessary, depending on the size and road mileage of the county. The central county warehouse will be equipped to make major equipment repairs and also to provide ample space for storage. The smaller warehouses will be used for storage and housing equipment. All equipment will then be purchased through a centrally responsible county purchasing agent, and the county will naturally obtain full value for its tax dollar.

It will be the responsibility of the centralized engineering authority for the county to review qualifications of maintenance personnel, such as superintendents and foremen, to be used in the county or parish maintenance organization. This will permit the hiring of experienced and qualified men, and the road work will be accomplished as justified by traffic needs of the county.

Loader-Lifter Does Small Moving Jobs

Usable for dirt moving on small construction projects such as soil conservation, in roadside development, and in highway maintenance, a hydraulic loader for mounting on any tricycle type of tractor is made by the Horn Mfg. Co. It has a lifting capacity of 1 ton, and its installation requires no changes in the tractor set-up.

The Horn-Draulic loader has a 16 x 40-inch steel bucket which is raised to a height of 11 feet by hydraulic action controlled by a lever at the driver's seat. With the load raised, the tractor can travel to another location for dumping without obstructing the operator's vision. The load can be lowered or dumped at will, and the bucket resets itself automatically. The loader is operated by twin hydraulic cylinders mounted on either side of the tractor.

It has no bolts, chains, belts, or gears. Further details on the Horn-Draulic loader are given in a folder, copies of which may be secured by writing to the Farm Equipment Division, Horn Mfg. Co., Fort Dodge, Iowa. Just mention this item.

Hard-Facing Weld Rods

Recommended specially for hard-facing the blades, cutters, and scoops on bulldozers, buckets, crushers, dipper, and a wide variety of similar construction and maintenance equipment, a new hard-facing metal is being produced by Coast Metals, Inc. A brochure, Form X-202, describes the new development, which is made in two different rods, No. 190 for arc welding, and No. 90 for acetylene.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may obtain copies of Form X-202 and other literature by mentioning this notice when writing Coast Metals, Inc., 1232 Camden Ave., S.W., Canton 6, Ohio.

Repointing Dipper Teeth Pays Varied Dividends

Conservation of steel teeth, digging power, labor, and welding materials is said to result from the use of Wear-Sharp, manganese-steel repointers for dipper teeth. Produced by the Daniels-Murtaugh Co., these teeth have a sharp penetrating point, are easily installed, and readily replaced.

This new type of Wear-Sharp teeth, together with DMCO 1-piece points and three other styles of teeth having repointers, is illustrated in a new bulletin. Diagrams and specifications are presented, as is a chart of welding rods recommended for use with DMCO repointers.

Readers may procure copies of Bulletin No. 115 by writing the firm at 625 C Ave., N. W., Cedar Rapids, Iowa.

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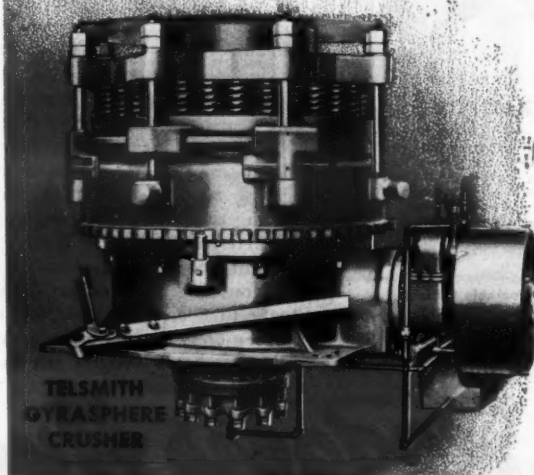
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.. IN 5 YEARS with TELSMITH



They use a lot of ballast on the A.T.S.F. Ry. Much of it is supplied by the Sharpe & Fellows Contracting Co. of Los Angeles, California. This is one of their quarries—at Sais, New Mexico, southeast of Albuquerque. Here a 48" Telsmith Gyrasphere Secondary Crusher, powered by a D-17000 Diesel engine, has crushed 1 1/3 million cu. yds. of hard rock down to ballast size, in the past five years. Their crushing plant is also equipped with two 5' x 12' Telsmith Double Deck Pulsator Screens.

If you want a secondary crusher that works at choke feed... crushes finer... that turns out enormous tonnage... all of it remarkably uniform... and does it with lowest upkeep, get a Telsmith Gyrasphere. Telsmith Pulsators assure efficient, low-cost screening. Send for Telsmith Complete Plant Bulletin Q-34.

Q-15

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Quarry and Plant Set-Up For 50,000-Ton Production

Lane Construction Corp. Used Single Power Plant With Belt Drive for All Crushers and Screens

+ A 100-ton-an-hour crushing and screening plant driven by a Fairbanks-Morse 2-cylinder 140-hp diesel engine through belt drives from an 88-foot x 3 15/16-inch-diameter line shaft produced the 50,000 tons of crushed stone for a 6-mile contract for a 10-9-10-inch waterbound-macadam base 24 feet wide laid on a 4-inch subgrade treatment on U. S. 250 near Charlottesville, Va. The contractor for this project was the Lane Construction Corp. of Meriden, Conn.

The crushing and screening plant was set up not more than 1/2 mile from a quarry where J. H. Blackley, Quarry Superintendent, worked with a crew of eight men to reduce the quarry face to stone sizes suitable for the primary crusher. On the quarry face, about 250 feet long and 40 feet high, three Ingersoll-Rand wagon drills with 8-foot hoists drilled the holes on 5-foot centers both ways for blasting out 14 to 18-foot lifts. After the 3 feet of overburden was removed by a bulldozer, the wagon drills were started with 3-inch Timken detachable bits, working down to 2 1/4-inch by 1/8-inch gages. The rock was considerably softer at the top of the face where the bits easily drilled up to 5 feet of the hole; towards the bottom this was reduced to only 6 inches before they had to be resharpened.

Three portable compressors, teamed up well back of the face, delivered air at 100 psi to a 750-cubic-foot receiver through a 4-inch pipe which acted as a cooler for the air. The compressor battery consisted of a Sullivan 315-cfm, a Gardner-Denver 315-cfm, and a Chicago Pneumatic 500-cfm machine.

The drilled holes were loaded with 60 per cent strength Trojan dynamite by placing 14 sticks in the bottom of the hole with 3 to 4 feet of dirt well tamped on top and a du Pont exploder at about the middle of the column of dynamite. On top of the tamped earth two more sticks were placed with an exploder and the tamping finished to the surface. As many as 300 holes were fired at a time in series by a 100-hole Atlas hand battery.

The rock was generally reduced to a size which could be loaded readily by the Northwest shovel with its 1 1/2-yard Amsco rock bucket and handled satisfactorily by the primary crusher, but there were some pieces which had to be redrilled and shot. No mud-capping was done because there are some dwellings located within 1/4 mile of this quarry.

The rock was hauled about 1/2 mile from the quarry to a dumping platform and chute part way up the hill behind and above the primary crusher. Four trucks did the shuttle hauling.

Power Plant

From the time the first equipment for the crushing and screening plant was hauled to the site, the complete plant was placed in operation under its own power within five weeks. This included the necessary concrete foundations which required over 700 bags of cement. The prime mover for the entire plant was a Fairbanks-Morse 2-cylinder 140-hp diesel engine with a clutch connecting the main drive belt to the 88-foot long x 3 15/16-inch-diameter line shaft.

There is a distinct element of safety in having one driving unit for the en-



C. & E. M. Photo

A 100-ton-an-hour crushing and screening plant was set up by Lane Construction Corp. to furnish aggregate for a 6-mile contract near Charlottesville, Va.

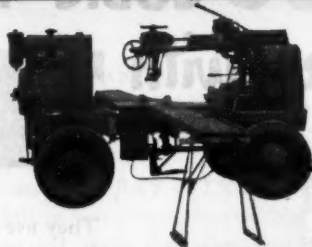
tire plant. A man is stationed at the power plant at all times so that if any accident happens the throwing out of the single clutch stops the entire plant. Further, there is no chance that one part of the plant might be started up again ahead of another, thus piling up material at a screen or crusher. When

the main single clutch is thrown in, the entire plant starts immediately as a unit.

The foundation for the 25-ton diesel engine measured 22 x 8 x 6 feet deep. On this the engine block was cast, measuring 5 x 8 x 2 feet. The engine (Continued on next page)

Idle crawlers earn no money

*...here's the way to whip them back in service
with amazing savings in time and labor!*



MR. CONTRACTOR . . .

Your dealer probably has Rodgers Track Servicing Presses in his service department for the purpose of helping you maintain your equipment. If he hasn't and your requirements won't justify your having a Rodgers Press of your own, urge him to investigate the savings of a Rodgers. It will pay you both!

Rodgers crawler track Presses

It's A WASTE OF TIME to lay up crawler-tractors a couple of days for routine track maintenance—it's unnecessary to slug the pins and tug or burn stubborn nuts. A Rodgers Track Press does the track service job . . . so easily . . . so fast. It takes just an average 3 or 4 hours machine time to service two large strings of track—and you can do it on the job with a *Portable Rodgers*.

An exclusive Rodgers feature is the Retractable Jaw which eliminates lifting the track over a stationary jaw and assures proper bearing support against the inner side of the rail, thus properly spacing the rails, eliminating any binding action—leaves tracks flexible after servicing. The Rodgers Track Wrench is the handy answer to tight, frozen nuts.

You can get a Rodgers Crawler-Track Press in portable models: 2 wheel trailer or 4 wheels; and in stationary shop models. Write now for complete details; or see your crawler equipment dealer—he will tell you what a Rodgers can do to save you time and labor.



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Complete line of
gasoline, pneumatic and electric driven
concrete vibrators and grinders
Write for information and prices

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C. & E. M. Photo
One of the Ingersoll-Rand wagon drills is hauled out preparatory to a shot at the Lane Construction Corp. quarry.

Quarry Set-Up

(Continued from preceding page)

was started with compressed air at 250-pound pressure from two tanks which were kept at starting pressure by means of a small Fairbanks-Morse compressor.

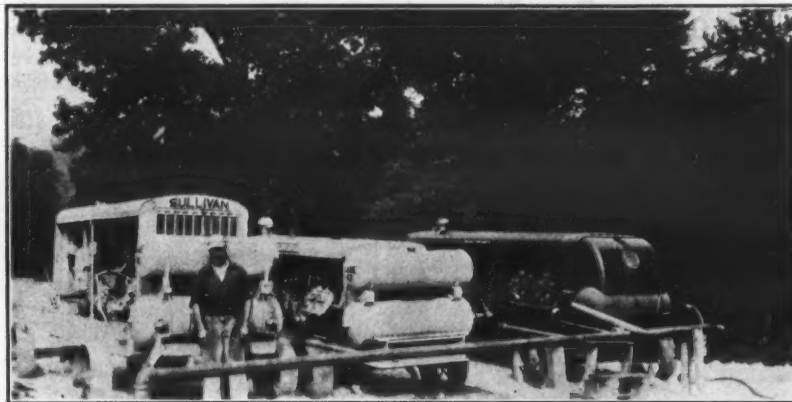
The diesel engine, which requires only 4 gallons of fuel per hour when operating at full load, was cooled by water supplied by a Fairbanks-Morse Typhoon 2,500-gallon-per-hour pump which ran by belt drive from a pulley on the engine shaft. The pump took water from the adjacent creek, delivering it to a 500-gallon rectangular tank just above the dumping platform for the primary crusher. An overflow returned water to the creek while a pipe connected with the engine permitted water to flow by gravity to and through the engine casing. A tap on the out-flow line at the engine made it possible to take heated water from the engine and deliver it to a shower bath located over the creek on the back of the engine house. These warm showers were greatly appreciated by the men at the end of the day when they were well coated with rock dust.

The Line-Shaft Drive

The 88-foot line shaft supported on fourteen bearings, each mounted on a concrete base and pillar, carried all of the main drive pulleys for the plant. There were two pulleys with belts to drive the primary crusher, one pulley and belt which drove three other belts through bevel gears and pulleys, a single pulley and belt for the conveyor carrying stone to the triple-deck screen, and two belts from pulleys on the line shaft to drive the secondary crusher. At most plants, separate electric motors or gas engines are provided to drive the vibrating screens, but at this plant they were driven off shafts at the top of the conveyor belts delivering crushed stone to the screens.

Crushing and Screening

The primary crusher installed at the plant was an 18 x 36 Cedarapids jaw crusher set for crushing to 5-inch-maximum stone. The run-of-crusher stone from the primary was picked up by a 55-foot x 24-inch conveyor belt



C. & E. M. Photo

A battery of three compressors furnished air for the wagon drills which prepared the holes for blasting in the quarry used by Lane Construction Corp. as the source of stone for a 6-mile road job in Virginia.

and delivered to the top deck of a Stephens-Adamson vibrating screen with 3½-inch openings. Stone passing through the screen went direct to a 75-foot x 20-inch belt which carried it up to a Seco three-deck vibrating screen

with a 2-inch screen in the top deck, a screen with ¾-inch openings in the middle deck, and ¼-inch openings in the bottom deck. Screened material went to a three-compartment bin from

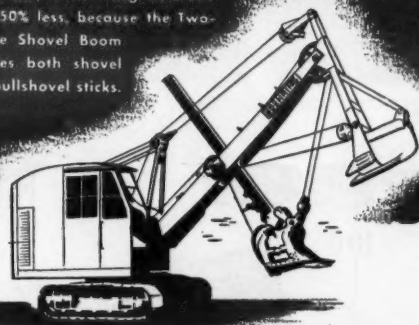
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On the "Bread-and-Butter" county drainage jobs that are the backbone of many a contractor's business, the Koehring 205, as a dragline, is an outstanding low-cost producer.

LOW COST CONVERTIBILITY

Adding the 205 shovel-pullshovel attachment to the dragline-crane costs 50% less, because the Two-in-One Shovel Boom handles both shovel and pullshovel sticks.



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CABLE ECONOMY: Cable leads, both drag and hoist, go over tops of drums; cable hugs drum grooving. Fairlead rotates.

PRECISION BRAKES, CLUTCHES: Inside band clutches are s-m-o-o-t-h. Brakes release completely.

SELF-CLEANING SHOES: Important when you're working in mud or on soft ground.

SAFE TRACTION BRAKES: Work securely on banks and inclines. Traction brakes, on both crawlers, can be engaged instantly, from the cab.

ANTI-FRICTION BEARINGS: Long casts, with drums spinning on anti-friction bearings, extend the reach of the Koehring 205.

Koehring Means Heavy-Duty — and like the larger Koehring 304 and 605, the 205 dragline-crane-shovel is built to high performance standards.

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Quarry Set-Up

(Continued from preceding page)

which it was delivered to trucks hauling it out to the stockpiles.

Oversize stone from the Stephens-Adamson scalping screen was delivered by a metal-lined chute to a Champion Good Roads 10 x 40 jaw crusher set to produce maximum 2½-inch stone. Crusher-run stone from this unit was delivered to a 50-foot x 20-inch belt which carried it half way up the primary delivery belt, returning it to the first vibrating screens.

Stone from the three storage bins beneath the three-deck vibrating screen was stockpiled on the hillside back of the plant and also at the outer edge of the quarry floor. The hauling roads between the quarry and the plant, and the road up to the dumping platform above the primary crusher and thence around a hairpin turn to the top of the hill from which the larger sizes of crushed stone were dumped for side-hill storage, were well maintained with crushed stone bladed to give a smooth firm surface. Similarly, the entrance road from the main highway, over which all of the crushed stone had eventually to be taken out, was maintained with the smaller sizes of crushed stone not called for in the waterbound-macadam specifications, or of which there was an excess.

No electricity from outside was brought in for any operation at the plant, but for emergency night work a Red Devil 2-kw portable electric plant was moved back and forth from the plant to the road, as needed.

Personnel

This crushing and screening plant was operated with a minimum of labor. The crew consisted of one man dumping the trucks at the platform above the primary crusher, two men feeding the primary crusher, one oiler, one laborer, and the Plant Superintendent, Walter Meling. E. D. "Doc" Moore was Superintendent for Lane Construction Corp. of Meriden, Conn., on this entire contract, including the production of aggregate and the 6-mile waterbound-macadam base and surface treatment. The work was done under the direction of T. F. Loughborough, Construction Engineer, Virginia Department of Highways, with R. Cary Ambler as Resident Engineer, and L. O. Hines, Chief Inspector on the job.

New Drafting Pencil Of Mechanical Type

Designed to eliminate the annoyance of broken lead, a new draftsman's refillable pencil has been announced by the Charles Bruning Co. The pencil, No. 3583, is made on an entirely new principle, by which a new-type clutch holds the lead firmly in a non-slip rubber grip, preventing the usual nicking and scoring that cause breakage.

Light in weight, the mechanical pencil is built to take any full-length standard drafting lead, from 0.079 to 0.070 inch. The finger grip is knurled to offset slippage, and the tapering point merges smoothly with the lead, for finger comfort in lettering. An adjustable cap provides identification of the grade of lead being used.

Draftsmen and engineers may procure the pencil from the Charles Bruning Co., 4654-8 Montrose Ave., Chicago 41, Ill.

Rubber-Hose Fittings

The use of hose fittings and couplings is discussed by the B. F. Goodrich Co. in a new looseleaf catalog section. The bulletin illustrates shank, high-pressure, and sleeve-type couplings, hose

clamps, nipples, flanges, washers, and nozzles which the firm supplies with its rubber hose. Instructions are given for the proper attachment and care of couplings.

Copies of Catalog Section No. 3100 may be secured direct from the B. F. Goodrich Co., Akron, Ohio, by mentioning this magazine.

Alaska PRA Head Retires

Melvin D. Williams, District Engineer in charge of the Alaska office of the Public Roads Administration, has retired after 27 years with the agency. Mr. Williams served the PRA office at Ogden, Utah, from 1919 to 1925, supervising forest road surveys and construction.

Transferring to Alaska, he supervised the construction of many roads in the national forests of the territory. Earlier in his career, Mr. Williams was with the Reclamation Service, served as Klamath County, Oreg., Surveyor, and as an engineer in the office of the City Engineer for Los Angeles, Calif.



"Progress forgot my address"...

"I hear a man can fly half-way across the country nowadays in four hours.

Funny . . . it takes me almost that long sometimes to haul my crops twenty miles to the railroad siding. Nasty weather I can't get there at all—the road's that bad. Progress?"

Sometimes I wonder . . ."

Maybe you've wondered, too, about the condition of America's country roads. These roads—2,400,000 miles of them—serve 6,000,000 farms. They link rural Americans with their schools, churches, markets, neighbors. Yet, more than half of them have no surfacing of any kind, and over one-third are still classed as *primitive*.

True progress calls for planned maintenance and improvement of this vital road network. Barrett

Tarvia*, a serviceable and economical road tar, can help—as it has helped in the past.

Why not discuss your road problems with the Tarvia field man?



THE BARRETT DIVISION

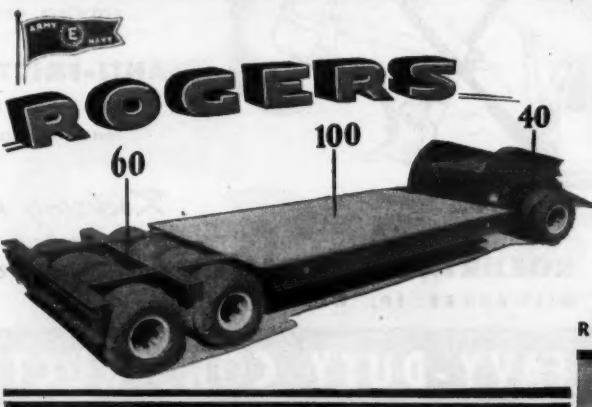
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Contribute to Unusual Performance

ROGERS TRAILERS are so designed as to carry 60% of the load on the rear unit and 40% on the tractor.

This provides the necessary traction—distributes the load properly over all tires—and greatly improves the haulability and brakeability of both tractor and trailer.



ROGERS BROTHERS CORP.




ALBION, PENNA.

EXPERIENCE
Builds 'em

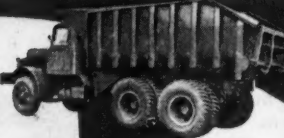
PERFORMANCE
Sells 'em

(Continued from page 6)


BETTER BUILT FOR BEST PERFORMANCE




Garage side dump Body with telescopic Hoist. Automatic downfold.




Type X12 heavy duty Body with automatic downfold.



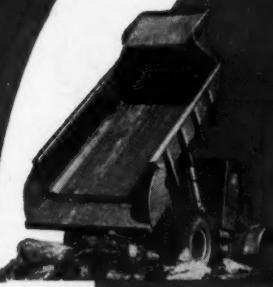
Type C12 Body with Model T440 dual telescopic Hoist. Capacity 18 cu. yds.




Type W12 Body front recessed Model TV83 Hoist. Capacity 19 cu. yds.



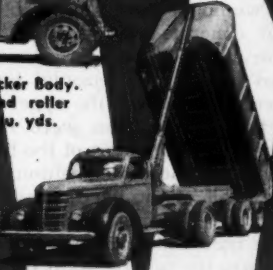
Special scoop and mucker Body. Model F88 cam and roller Hoist. Capacity 5 cu. yds.




Rock excavating Body with downfolding gate.



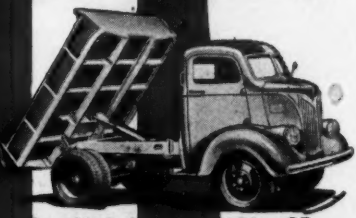
Type W12 Body Model F4C cam and roller Hoist. Capacity 18 cu. yds.




Type W12 Body front recessed Model TV83 Hoist. Capacity 18 cu. yds.




Telescopic boom Body. Capacity 8 to 20 cu. yds.




Type C12 Body Model D6 or D7 Hoist. Dumping angle 55°.




Solid front and rear mounted Body.



Type W12 Body with single telescopic Hoist. Double eating full gate. Capacity 8 cu. yds.




Type W12 Body Model F88 cam and roller Hoist. Capacity 18 cu. yds.



Cable front loader with angling blade.

TRADE MARK



GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST. • DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: TANKS • HEATING EQUIPMENT • MOTOR BOATS

Construction Features Of 4,200-Foot Siphon

(Continued from preceding page)

able to set up and pour a 25-foot section of the siphon during each 8-hour day, which required only three sets except when special difficulties of form setting caused by changes in grade and alignment interfered.

Placing the Concrete

Concrete was delivered to the points of placement by three 4-cubic-yard Smith truck-mixers, mounted on one Mack and two Kenworth chassis. The basic concrete mix was a 1:2.4:3.6 design, with a water-cement ratio of 0.56. The two sizes of gravel, 1½ to ¾-inch, and ¾ to ¼-inch, were combined in equal quantities. The dry weights of the batch per cubic yard of mixed concrete follow:

Cement	1.45 bbls.
Sand	1,300 lbs.
Gravel, 1½ to ¾-inch	980 lbs.
Gravel, ¾ to ¼-inch	980 lbs.

Each sectional pour required seven of the 4-cubic-yard loads because of some loss in additional thickness in the invert. Because of this unformed section at the bottom of the barrel, it was necessary that the slump be closely controlled at 3 inches so that the concrete would flow readily around the reinforcing steel and still be stiff enough to hold its position in the invert.

The truck-mixers drove alongside the excavation and dumped their loads into a 1-cubic-yard bottom-dump bucket which carried a tapered canvas and rubber elephant-trunk beneath. This bucket was handled by the Bucyrus-Erie 20-B crane. Four shallow receiving hoppers of light-weight construction were placed on top of the forms, supported by the horizontal cross members of the outside-form framework. These hoppers discharged the concrete through short lengths of 8-inch-diameter canvas-rubber tremies to the forms. Two hoppers were used on each side and concrete was placed alternately on each side, and progressively from end to end in horizontal layers. The movable sections at the upper portion of the outside form were raised out of the way at the start of the barrel pour and not placed in position until the lower half of the barrel was filled with concrete. The first concrete placed was made quite stiff so that it could be used to form the invert. As it dropped down through the side forms, it was spaded into place by three men using shovels and short pieces of 1 x 2-inch lumber. Little vibrating was done during this part of the pour so that the concrete would not tend to slump too rapidly and destroy the proper shape of the invert. This invert was finally shaped by a screed made of a 2 x 12-inch board cut to the proper radius and pulled forward by two men while two others held it down to its proper position. Hand floating with wood floats followed the screeding and then the invert was given a final steel-trowel finish.

When the walls were full to the height of the vertical outside form, the movable portions were slid down into place and wired to the studs, and concrete placing continued. Three men working on top of the outside form moved the shallow hoppers as needed and released the concrete from the bottom-dump bucket. Two other men used Mall portable vibrators, one working on each side, to vibrate all concrete in place inside the forms except that first placed to form the invert. A third Mall vibrator was kept in position ready for auxiliary service if either of those in use should break down during placing operations.

To prevent possibility of damage from

water flowing through the porous gravel placed under the invert and covered with roofing felt, a 3-inch Rex Speed Prime pump was kept running at the end of the section in which concrete was being placed all during the operation, and a Kohler 1.5-kw light plant provided illumination for work inside the barrel section.

A total crew of twelve men, in addition to the foreman and crane operator, handled the concreting and finishing for each sectional pour which was usually completed in two hours or less.

Specifications provided that the forms could be removed when the concrete reached a compressive strength of 750 pounds per square inch, and that the outside form could be taken off when the strength was 500 pounds per square inch. This usually meant 18 to 20 hours so that the outer form could be removed the following day, while the inner form was stripped a day later. Tuffalt Seal-cure was sprayed on the completed concrete by a 2½-gallon back-pack hand spray, and the initial backfilling to the

spring line was done promptly after the removal of the outer form by men who shoveled the material into place and compacted it by air tampers powered by a two-stage Ingersoll-Rand Model K 105-cfm compressor pulled alongside the trench area.

Major Quantities

The major bid items of the contract of which the construction of the Olmsted siphon was a part included:

Excavation, common, for structures	82,000 cu. yds.
Excavation, rock, for structures	3,000 cu. yds.
Reinforcing steel in place	1,900,000 lbs.
Welding 1½-inch square reinforcing bars	27
Placing metal water-stop	40,000 lbs.
Concrete in structures	7,600 cu. yds.

Personnel

This contract for the construction of a number of major structures incidental to the enlargement of the Provo Reservoir Canal in Utah was awarded to J. B. and R. E. Walker, Inc., Salt Lake City, by the U. S. Bureau of Reclamation on April 12, 1944, for \$359,311.33. Work on the Olmsted siphon was started on June 7, 1944, and was com-

pleted by the end of 1945.

The construction of the Provo River Project, of which the foregoing work is a part, is being carried out by the Bureau of Reclamation, under the general direction of the Denver Office and E. O. Larson, Regional Director, Region 4. Field operations on the Olmsted siphon were under the general supervision of C. J. Sherry and the immediate supervision of R. L. Greenhalgh.

Heads N. Y. Research Unit

Major Bernard A. Lefevre has been appointed Director of the newly formed Bureau of Research and Statistics in the New York State Department of Public Works, Superintendent Charles H. Sells has announced. The Major has spent five years in the Division of Research and Tests of the Port of New York Authority. He did bridge design work for the State before the war, and held post engineering appointments at Pine Camp and Suffolk Army Airfield during the war.

HARD AT WORK

ON THOUSANDS OF HURRY-UP JOBS

WHEREVER you hear the sound of a Barco Portable Hammer at work you can be sure the big job of reconversion and expansion is getting done. And all over the country that sound grows louder. For a Barco is the accepted tool on any job that calls for driving, drilling, breaking or digging. Its economy, its steady, dependable performance, its ability to multiply manpower, are winning it ever-widening favor as the pace of industry quickens. For full particulars write us immediately. Barco Manufacturing Co., Not Inc., 1818 Winnemac Avenue, Chicago, Ill.

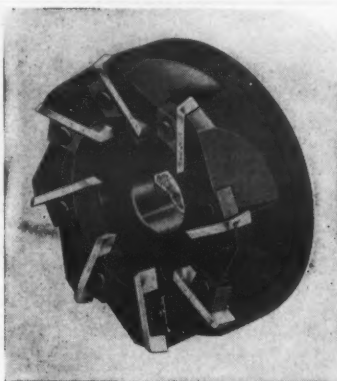
BARCO
Portable Gasoline
HAMMERS

1818 Winnemac Avenue, Chicago, Ill.

Milling Cutter Has Detachable Blades

A novel milling cutter, the Universal Face Kennamill, has been developed by Kennametal, Inc., Latrobe, Pa. The device consists of a tool holder in which detachable metal cutting blades are held in position mechanically. This set-up eliminates the need for removing the cutter body from the spindle since only the blades need be taken off and replaced in order to have a different cutter.

The Universal Face Mill is built in five body sizes, with 4, 6, 8, 10, and 12-inch diameters. Kennametal blades of the proper cutting grade and required work angle are placed in the miller. The setup is said to use low power for forming and removing chips, and to have a high rate of metal removal, long cutter life, and simplified maintenance needs. According to Kennametal, no coolant is required as the heat of cutting is absorbed by the chips, while the work and cutter remain cool.



The Kennametal Universal cutter with detachable blades is designed to mill a variety of material.

Wedging components are said to be finished to such close tolerances on dimensions and angles that the blades can be positioned to within a maximum run-out of only a few thousandths on the periphery. When dull, the blades may be removed by hand, ground to the

proper sharpness, and replaced.

Highway department shop superintendents may secure full details concerning the Universal Face Mill direct from the manufacturer by mentioning this item.

Tournacrane Bulletin

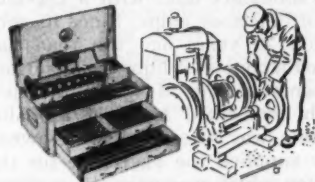
The varied on and off-the-road uses of the big-tired Tournacrane are shown in a new 6-page brochure issued by R. G. LeTourneau, Inc. The different models are illustrated in operations requiring long reach, high lifting, mobility, and the ability to handle bulky or heavy loads. Special applications of the unit devised for the Army and Navy are shown, together with the versatile Tournalift. The brochure features a chart which portrays the limits of the lift, reach, and weight capacity of the various Tournacrane models.

Readers may obtain the folder, Form C-633, without obligation from R. G. LeTourneau, Inc., Peoria, Ill., on mention of this item.

BLACKHAWK PRODUCTS are Basic in CONSTRUCTION and MAINTENANCE

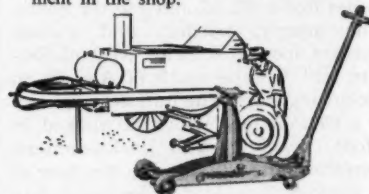
Blackhawk Socket Wrenches

— in a complete range — give you exclusive combinations of handles, sockets and attachments that speed work — Blackhawk Wrenches with patented thumb release "Lock-on" create extra safety and more dependable performance.

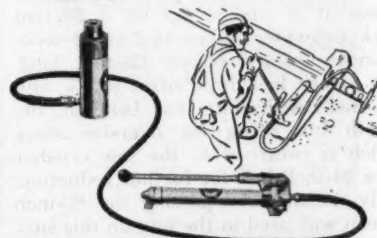


Blackhawk Hydraulic Service

Jacks — are indispensable in the shop or on the job. Sure, fast, 24" lift of the Blackhawk S4, with EXCLUSIVE features, makes it ideal for high axled machinery — and for jockeying equipment in the shop.



Porto-Power — EXCLUSIVE — is literally an all-purpose tool. It pushes, pulls, bends, clamps, presses and straightens — with tons of power. This safe, easily transported, remotely controlled hydraulic jack provides on-the-spot hydraulic power to lick 1001 tough jobs.



Blackhawk Hydraulic Jacks

— meet the demands of construction work with an unequalled "service proved" record of dependability, performance and freedom from maintenance. Powerful, fast acting, Blackhawk Jacks are real time savers on the job.



THE blistering pace of construction will require the best in fast working, modern tools. Unmatched versatility, speed and dependability of Blackhawk Products make them key tools for you. This multi-purpose equipment serves in every phase of construction and maintenance work. These modern, quality Blackhawk tools are built tough and rugged to stand the gaff. They're basic design is different, making them tops for speed and utility. For complete information on Blackhawk Products write us or see your Blackhawk Equipment Distributor. BLACKHAWK MFG. COMPANY, Dept. P-1836, Milwaukee 1, Wisconsin.

BLACKHAWK



Heavy Duty GMCs are "made to order" for all kinds of heavy hauling jobs. On or off the highway, you can count on GMCs to provide peak performance and pulling power.

Patterned after the powerplant used in nearly 600,000 GMC military vehicles, GMC valve-in-head engines have been battle-tested, war-proved and improved. GMC heavy duty engines are famous for such features as Turbo-Top pistons, stellite faced exhaust valve seat inserts, full pressure lubrication, full length

water jackets and 7-bearing crankshafts with steel-backed, precision-type bearings.

Ruggedness and stamina are built into every feature of GMC chassis. Heavy duty clutches . . . five-speed, synchro-mesh transmissions . . . power hydraulic or air brakes . . . dual-performance, double reduction or worm drive axles . . . add super strength to heavy duty GMCs.

Remember, too, every GMC, 1/2 to 20 tons, is truck-engineered and truck-built by the largest exclusive producer of commercial vehicles.

THE TRUCK OF VALUE



GASOLINE • DIESEL

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

New Plant-Mix Top Laid for 18 Miles

**State Ran Stone Quarry
And Asphalt Plant; Hauled
Mix 15 Miles to Two Pavers
Laying 17-Foot Top**

† STATE maintenance forces recently laid a single-course bituminous plant-mix topping on 18 miles of Ala. Route 24, from the city limits of Decatur, Ala., west to Moulton in the northwest corner of the state. The road which was improved had a 16-foot waterbound-macadam pavement, 8 inches thick, with 4-foot shoulders built with a 2½-inch layer of limestone chips. Since its construction 20 years ago the road had received a couple of liquid-seal-surface treatments on top of which the new 5½-inch compacted layer of asphaltic plant-mix was spread. A state-owned quarry supplied the aggregate for the black-top which was mixed in a state-owned asphalt plant, and hauled an average of 15 miles in a fleet of twenty trucks to the job site, where two Adnun Black Top Pavers spread the material. The route was closed during the construction operations while traffic used parallel Route 20, 15 miles to the north.

The quarry, crusher, and asphalt plant are located 6 miles west of Decatur, and ½ mile south of Ala. 20 on a secondary road. The limestone quarry has a 60-foot face which is worked in 10-foot benches with jackhammers. When the stone is blasted to the floor of the quarry, it is loaded by hand into Dempster Dumpster buckets which are hauled a few hundred feet by a truck and dumped into a hopper.

Stone Crusher

The hopper feeds the stone into a 15 x 24-inch Diamond jaw crusher, from where it is picked up by a 30-foot bucket elevator and carried to a 3-foot-diameter rotary screen 12 feet long. The screen has three sizes, ¼, ⅜, and 1¼-inch, with four bins beneath, the fourth bin being for oversize stone which is returned to the jaw crusher on a 30-inch belt for further reduction. Only the material passing the ¼-inch screen was used in the mix on this surfacing job. The crusher, rotary screen, and conveyor belts are driven by a Fairbanks-Morse 60-hp electric motor. Trucks haul the stone a few hundred feet from the bins and dump it in a stockpile near the asphalt plant.

Asphalt Plant

The AC-12 asphalt for the mix was purchased from the Southland Co. and transported by rail 300 miles from its plant at Crupp, Miss., to a Southern Railway siding at Trinity, Ala. Here the tank cars were heated by a 40-hp portable coal-burning vertical boiler, and the asphalt was pumped into transfer tank trucks which hauled it a mile to two 20,000-gallon storage tanks alongside a Cedarapids portable asphalt plant.

From the stockpile the aggregate was loaded into a 20-yard hopper by a



C. & E. M. Photo

The State-operated asphalt plant near Decatur, Ala., which furnished the surfacing for an 18-mile road-improvement project, loads a truck with plant-mix.

Lorain crane with a 30-foot boom and a ½-yard Haiss clamshell bucket, with a Caterpillar D7 tractor-dozzer pushing

the material to the crane. The hopper was located over the center of a 24-inch belt, 24 feet long, which carried the

stone along to a 10-foot cold bucket elevator leading to a single-drum drier, 24 feet long x 5 feet in diameter, lined with refractor brick. At the north end of the drier was a 3-foot-diameter smoke stack, 30 feet high, to draw off the smoke and vapors. Heat for the drier was furnished by a Hauck torch burning vaporized fuel oil. The fuel oil was pumped from a 12,000-gallon tank by a Gardner-Denver fuel-oil pump, and delivered under constant pressure to the jet where it was vaporized by steam delivered at 125-pound pressure from the main boiler. The belt conveyor, cold bucket elevator, and the drier were driven by an International UD-18 4-cylinder 1,330-rpm diesel engine which had a gear transmission to reduce its speed to 200 rpm.

In the drier the temperature of the stone was raised to 400 degrees F, after which it was carried by a 22-foot enclosed hot elevator to a Tyler double-deck vibrating screen, measuring 5½ x 3 feet. The upper screen, ½-inch square

(Continued on next page)



FAST-LOADING

HEIL CABLE SCRAPERS

move more dirt per hour ... at less expense



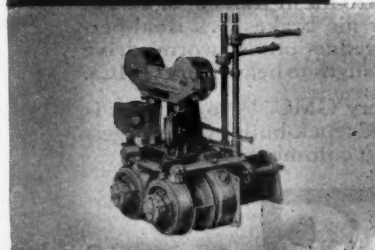
With Heil Cable Scrapers, you load easier because of the rapid raising and lowering of the bowl and the pivot-point location which places the weight of the scraper on the cutting bit — for better soil penetration.

You haul more yards because the correct bowl design follows the natural contour of boiling dirt — no voids or waste — bonus loads

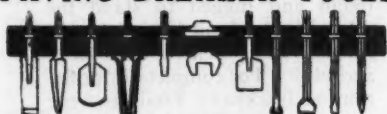
every time. You unload faster because Heil's tilting-floor, mechanical-push-out action requires less cable pull, wipes clean, discharges evenly and completely.

Heil engineering gives you rugged, all-welded construction and an all-around design that assures easier maintenance, simpler field repairs, and economical operating costs. Write for bulletin.

See your nearby Heil distributor.



"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of Tools for pneumatic paving breakers, rock drills and diggers.

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BICKNELL MANUFACTURING CO.

12 LIME STREET ROCKLAND, MAINE

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

R-63

Plant-Mix Top

(Continued from preceding page)

mesh, caught any sticks or outsize stones that may have become mixed with the 3/4-inch stone in the stockpile. The lower screen was a No. 10 mesh, and the stone that was retained on this screen was collected in one 50-cubic-foot bin, while the stone that passed it was collected in another 50-cubic-foot bin.

Another International UD-18 4-cylinder diesel engine drove the hot elevator, vibrating screens, pugmill, discharge conveyor belt, and a pump which delivered asphalt through a continuous loop in a 2 1/2-inch steam-jacketed pipe from the storage tanks to a weigh bucket equipped with a Kron dial scale. To conserve fuel, the 20,000-gallon asphalt storage tanks were heated only enough to keep the asphalt flowing by gravity into an adjacent 2,000-gallon tank, half buried in the ground. The asphalt in this smaller tank was heated by an 87-hp horizontal locomotive-type coal-burning boiler, which also furnished steam to vaporize the fuel oil for the drier torch, to heat the steam-jacketed pipes, and to operate the pugmill gates. Water for the boiler came from an underground pool, and was pumped through a crevice in the lime rock by a jet line from the boiler.

Batch Materials

In the 1-ton-capacity pugmill the batches were mixed 3/4 minute in the following average proportions:

Fine aggregate, passing No. 10 sieve	1,100 lbs.
Coarse aggregate, No. 10 to 3/4-inch	795 lbs.
AC-12 asphalt, 120-150 penetration	105 lbs.
	2,000 lbs.

The pugmill unloaded the material at 275 to 300 degrees F to a 20-foot discharge belt, 30 inches wide, which loaded 20 trucks, Internationals and Chevrolets, with 4 tons each of plant-mix. Tarpaulins were immediately pulled over the contents so that a loss of only 25 degrees resulted during the average 15-mile haul to where the plant-mix was laid. Twice a day the truck bodies were cleaned out with shovels and swabbed with fuel oil.

A 12-man crew made up of 5 free men and 7 convicts operated the Cedar-rapids asphalt plant. The white workers were the superintendent, foreman, plant operator, crane operator, and tractor-



C. & E. M. Photo

Working with two Adnun Black Top Pavers which laid 18 miles of plant-mix surface on Alabama 24, as a Highway Department maintenance job, were gangs of convicts.

dozer operator; the negro prison labor included a fireman, boiler man, scale checker, oiler, conveyor-belt tender, truck feeder, and water boy.

Laying the Mix

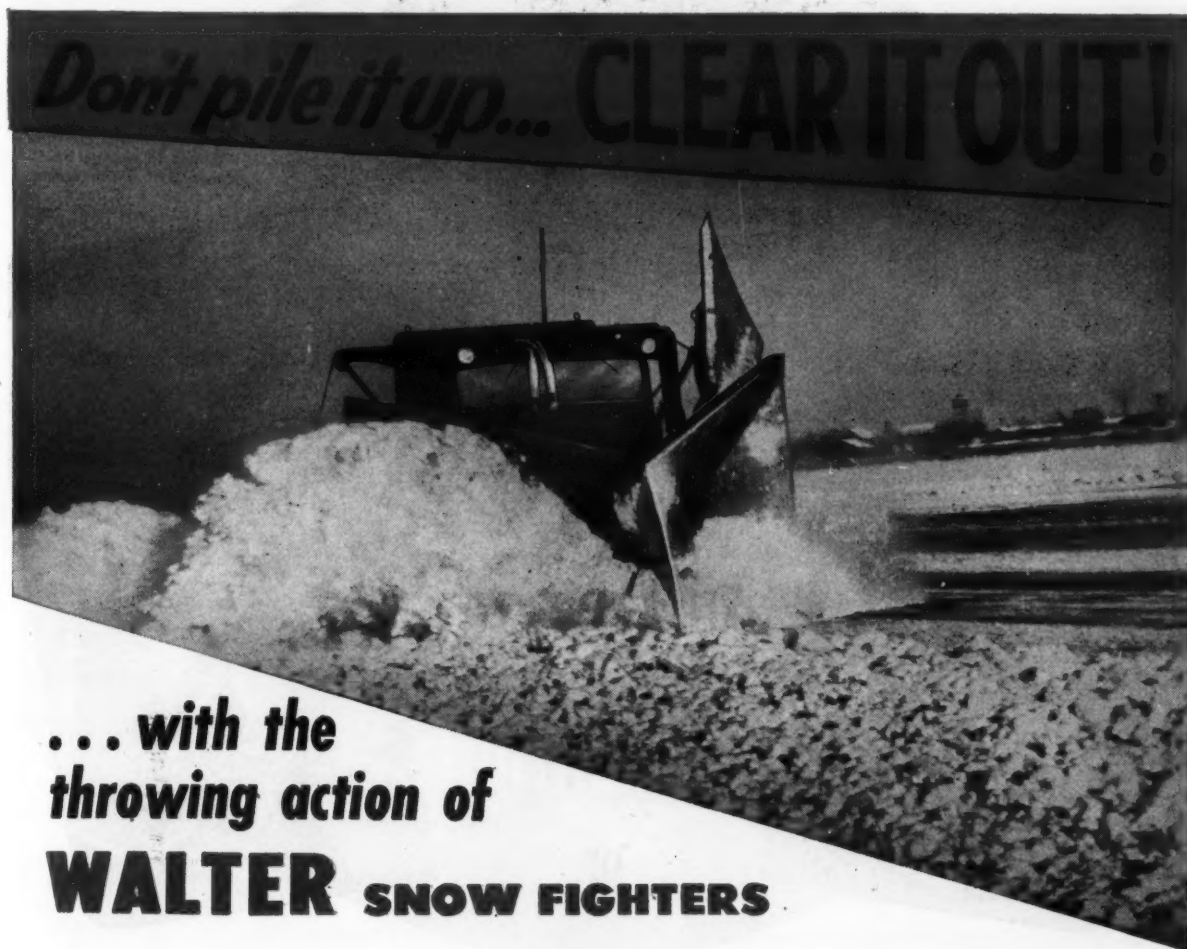
The surface of the road to be repaved was first cleaned with hand shovels, hoes, and hand brooms, and then given a tack-coat application of 0.05 gallon

of RC-2 asphalt to the square yard. The bituminous material was hauled from the state highway maintenance storage supply depot at Decatur in a tank truck, and transferred to a 560-gallon distributor mounted on a Ford chassis. A Littleford torch at the rear of the tank heated the asphalt to 140 degrees F before it was sprayed on the road. While one man drove the distributor along one

side of the road, another at the rear of the tank held a single nozzle, spraying nearly half the surface with a fine fog coat. This operation was repeated on the other half of the road and then down the center to cover any area which might have been skipped.

The plant-mix was laid 17 feet wide, or 1 foot wider than the old surface treatments, by two Adnun Black Top Pavers. The extra 6 inches was added to each side on top of the shoulder. Each paver spread 8 1/2 feet of plant-mix which was laid to a loose depth of 3/4 inch, averaging 60 to 70 pounds per square yard for the single course. It was compacted to 3/8 inch by two Galion 10-ton tandem rollers. To insure a smooth center joint, the pavers operated from 50 to 100 feet apart, with the rollers passing over a part of each lane in their progress down the middle of the road. Water for wetting the wheels of the pavers and rollers was supplied from an 800-gallon tank mounted on a Ford truck which was filled by pump-

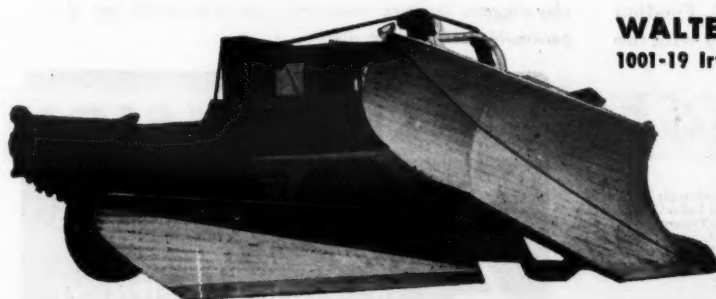
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... with the throwing action of WALTER SNOW FIGHTERS

● Avoid "slow-plowing" methods. They only pile snow higher—make it harder to handle with each successive run. *The right way is to hit snow fast, throw it far—really CLEAR IT OUT!* The way Walter Snow Fighters do on their 20-30 m.p.h. runs that leave less to be re-handled and speed widening out. Clearing more snow per hour, Walter Snow Fighters diminish the danger of frozen ruts and ice—rid main highways of snow faster—get on secondary roads sooner.

Walter Snow Fighters maintain high speeds on snow and ice because their tremendous power is transformed into smooth, positive traction by the exclusive Walter Four Point Positive Drive. Three automatic locking differentials proportion the power to the FOUR driving wheels according to the traction of each wheel at any instant. No wheel spinning, consequently there's no dangerous side slipping. Positive traction is but one of the features that make these units Snow Fighters in every respect. Others are described in detailed literature. Write for it.



WALTER MOTOR TRUCK COMPANY
1001-19 Irving Avenue, Ridgewood 27, Queens, L. I., N. Y.



**LA CROSSE TRAILER
AND
EQUIPMENT CO.**

Manufacturers

OF

**HEAVY DUTY
MACHINERY
TRAILERS
FOR ALL PURPOSES**

INFORMATION ON
REQUEST

LA CROSSE

WISC.

Plant-Mix Top

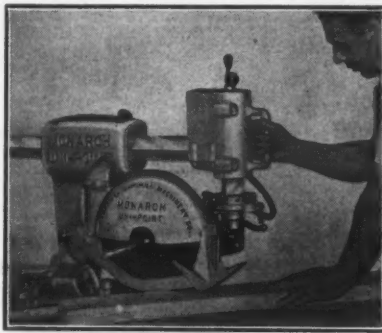
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ing from streams along the road.

Personnel

The truck drivers were free white labor as were also the foreman of the road gang, 2 paver operators, 2 roller operators, and 2 guards. Working with them was a crew of 13 convicts, 3 rakers and 2 shovelers assigned to each paver, 2 trustees who operated the distributor tank truck, and a water boy.

For the Alabama State Highway Department, G. W. Phillips is Construction and Maintenance Engineer, J. F. Tribble is Bituminous Engineer, and F. W. Weldy, Assistant Maintenance Engineer. The work was done in the First Division of which S. E. Caudill is Division Engineer, with G. H. Grisham, Assistant Division Engineer, supervising this reconstruction. A. L. Wallace was Resident Engineer on the laying of the plant-mix, while C. O. Cox was Superintendent.



The new Monarch Uni-Point 12-inch radial saw, readily portable by two men, is designed for accurate cutting on a variety of woodworking jobs.

Portable Radial Saw Gives Accurate Cut

Said to be the first saw on the market to be made almost entirely of magnesium, a new 12-inch portable machine has been added to the Monarch Uni-Point line of woodworking machinery. The light-weight unit has a 1½-hp

motor, weighs about 200 pounds, and can be carried by two men.

The new Uni-Point has a 3 x 16-inch cross cut and a 20½-inch-wide ripping capacity. It embodies the principal features of the large stationary Moharchs, including "one-point cutting". Safety, speed, and accuracy are augmented by a hardened-steel safety arm which carries the saw assembly forward on self-aligning rollers when making a cut. There are no visual obstructions while cutting, and no overhead obstacles.

A forward stride in the maintenance of radial-saw accuracy is said to result from the design of the bearing structure through which the safety arm glides in the housing. Accuracy of cut is maintained by eight hardened-steel ball-bearing rollers through five simple adjustments. Other features include a special saw guard, a kick-back preventer for ripping, and "contour design" for safety. Special attachments may be installed for many other woodworking jobs.

Literature and further details on the

new Monarch Uni-Point may be obtained by readers of this magazine by writing to the American Saw Mill Machinery Co., Hackettstown, N. J., and mentioning this news item.

Nearly one-third of the 14,000 miles of New York state highways are scheduled for reconstruction or replacement during the five-year \$840,000,000 public works program.

*Double Pumps
Speed Heavy
Load Lifting*

Simplex 50HJ Hydraulic Jack, capacity 50 tons, hydraulic lift 7". No. 30HJ, same design, capacity 30 tons. Also 3, 5, 8, 12 and 20-ton Hydraulic Jacks.



New standards for the easy and speedy lifting of heavy loads have been established by Simplex 30 and 50-ton Hydraulic Jacks. Each of these units has two pumps—high and low speed—which can be operated singly or in unison, providing smooth and ample power for every lifting job.

Simplex Hydraulic Jacks are ruggedly constructed throughout. The base is of special analysis solid steel plate stock. Stability is assured by the well-balanced pyramid design. Other features include: non-deteriorating pressure seals, shielded release valves, double lever socket for convenient operation in close quarters, and an overload safety factor of 50%.

Sold by leading supply houses everywhere.

Templeton, Kenly & Co.
Chicago 44, Ill.

SIMPLEX
WORLD'S MOST
COMPLETE
LINE OF
JACKS
LEVER
SCREW
HYDRAULIC



Drilling a high breast hole. Note the use of a second plank 2" x 12" x 20' with block nailed on same to hold 10-foot board.



Drilling lifters. The feed bar is secured to a plank (2" x 12" x 10') by the use of two U-bolts. Notch at back of plank fits the pin to prevent side movement.

It's easy to change steels—simply swing the machine around the feed bar.

**A
PROFITABLE
APPLICATION**

OF

THE CLEVELAND HC10 AIR FEED SINKER

Contractors, widening cuts and grades on road work, can duplicate this use of the Cleveland HC10 to great advantage.

The three illustrations with their captions, fully explain this system which makes it possible to switch from lifters to breast holes with a minimum of delay. Besides the speed and simplicity of this assembly of the HC10, you gain many other advantages with this air feed sinker: 1. Feeding into the rock is quick, steady, and easy with the

air cylinder. 2. The return is just as easy, and very simply done, by hand. 3. Throttle and air feed controls are conveniently placed, easy to get at, in all positions. 4. Exhaust is readily directed where you want it. 5. Air and water connections are straight away, in the rear of the backhead.

We also make sinker drills, paving breakers, wagon drills, clay diggers, tampers, accessories and a complete line of pneumatic tools for shop use.

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THE CLEVELAND PNEUMATIC TOOL COMPANY

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

Leaders-
in DRILLING EQUIPMENT

Grading 10.2 Miles In Gumbo and Shale

Work on Pre-Pearl-Harbor Relocation Job Resumed To Improve U. S. Route In South Dakota

WORK on a highway grading contract near Pierre, S. Dak., which was interrupted when the Japs decided to upset our national economy, was recently resumed. The contract for this work was awarded to the Jarvis Construction Co., Sioux Falls, S. Dak., and R. P. England, Murdo, S. Dak., by the South Dakota State Highway Commission in 1941 and construction was started during that year. The winter cessation of operations, customary in South Dakota, occurred late in the autumn, and, because of the war, construction was not resumed until September, 1945, at which time Dave Gustafson & Co. of Sioux Falls took over the contract.

The project, FAP 457 B (1), constitutes a relocation of U. S. 14 from a point about 9 miles east of Hayes eastward for a distance of 10.2 miles and included grading and drainage structures only, surfacing to be awarded later. Plans provided for a finished top width of 34.9 feet with 4 to 1 shoulder slopes. Backslopes of the cuts are usually 5 to 1 although in certain deep cuts this was steepened to 2 to 1 with transition sections of 3 to 1 and 4 to 1. When cut slopes were made steeper than 5 to 1 the intersection with the original ground line was rounded and streamlined. Ditches, which were utilized as borrow pits to obtain additional material with which to construct the embankments, were given a 14 to 1 slope away from the roadway and widths of from 8 to 14 feet.

Grading Operations

The contract lay through the rolling grass-covered hills of central South Dakota in an area of light rainfall but one that is subject to rather heavy runoff from melting snow in the spring of the year, and to flash floods, requiring adequate drainage structures. Both cuts and fills on the project were classed as heavy and the material is a dark-colored heavy gumbo-like soil which graduated into increasingly hard shale in the bottom of the cuts. Haul distances were moderate on most of the job.

For moving the dirt, the contractor had one 12-cubic-yard and four 18-cubic-yard LeTourneau scrapers, all of which were pulled by Caterpillar D8 tractors. An additional D8 was used as a pusher to expedite loading. During a period when one tractor was out of service and the scrapers were loading without a pusher, operations were so arranged that loading was done in a cut where the upper layers of gumbo were just becoming hard enough to be classified as a soft shale. The shale was not scarified and the scrapers loaded down a grade of approximately 6 per cent, picking up a full load in about 170 feet of travel.

Spreading was done in 6-inch layers, and two motor graders, a Model 11 and a Model 12 Caterpillar, smoothed the courses and dressed the sideslopes. The quantity of water called for in the specifications was approximately 7 gallons per cubic yard of excavation. Two water-tank trucks of 1,100 and 1,350-gallon capacity were kept busy hauling water from a stock pond located about 2 miles west of the east end of the job and ½ mile off the road. Compaction was obtained by two 2-drum sheepfoot rollers loaded with fuel oil, to eliminate the danger of freezing, to a weight sufficient to give a load of 150 pounds

per square inch. These rollers were pulled at a specified minimum speed of 3 miles per hour by an International ID wheel tractor and a gasoline-powered Caterpillar Twenty crawler tractor.

Under South Dakota specifications, no density tests of the completed embankment are required but the amount of rolling and watering necessary to secure the specified "stable compact mass" was determined in the field where two grading inspectors were constantly on duty. With the weight and speed of rolling specified, compaction was considered satisfactory when the sheepfoot rollers walked out of the embankment. A 10 to 15 per cent shrinkage from cut to fill was contemplated in the plans, but a slight waste

developed during the construction operations.

Grading operations were conducted during a single 12-hour shift, refueling being done during the noontime shutdown and lubrication being performed at night. Since that much daylight was available during the summer, no lighting equipment was provided for nighttime operations. Later in the autumn, one 10-hour shift was worked. Production averaged 5,800 cubic yards per day.

Special Stakes

A rather unusual feature observed on this job was the use of well made height stakes placed beside each slope stake from which to check the fills. These were 1 x 2-inch pieces of dressed lumber, painted white and with each foot and tenth-of-a-foot division marked with red paint. They were graduated from bottom to top, with a green cloth tied around them at the grade of the completed top of the fill and were used constantly by both grade

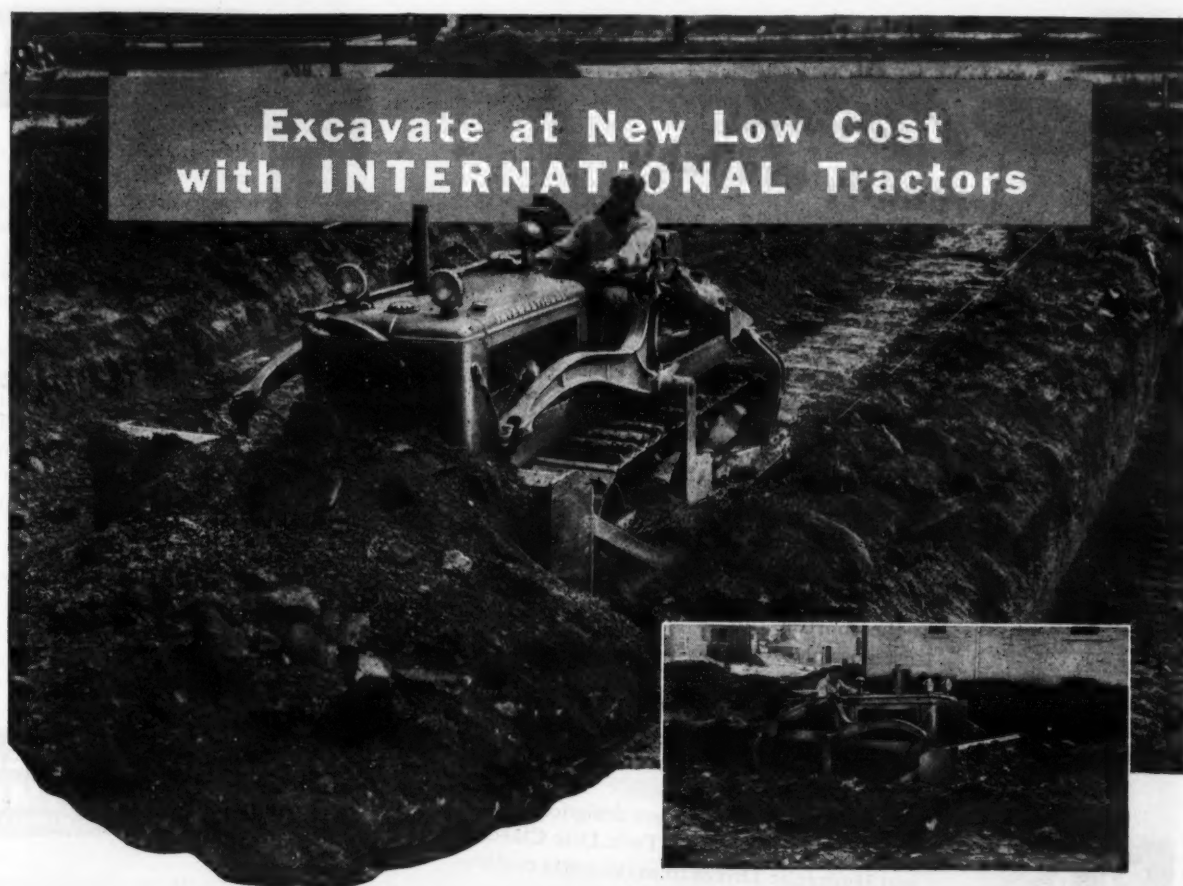


"I wondered how you kept traffic off your grade."

foremen and inspectors in checking the height of the fills and the trueness of the slopes by the use of hand levels.

Major Bid Items

The major bid items involved in this contract included the following:
(Concluded on next page)



THE use of International Diesel TracTracTors for digging basements and other excavations is a distinctly advanced practice. Costs are lowered materially; the work is speeded; time is saved. Many operators who have specialized in excavation work with TracTracTors enjoy a remarkable volume of business because of these advantages.

In homesite subdivision developments, whole blocks of basements are often excavated in one operation by a single International Crawler!

The International TD-14 TracTracTor shown in the photographs is owned by a basement specialist in the midwest. At this particular

site, it was excavating 420 cubic yards of clay. Average depth was 6 feet. Average distance from cut to spoil was 60 feet. The excavation was completed in 6½ hours.

International Diesel TracTracTors are instant-starting, fast-working and dependable, full-Diesel crawlers that get work done at lowest cost with minimum maintenance. Check up on the new tractors and matched equipment now available through the International Industrial Power Distributor near you.

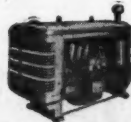
Industrial Power Division

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

TracTracTors



POWER UNITS



WHEEL TRACTORS



INTERNATIONAL



Industrial Power

Grading 10.2 Miles In Gumbo and Shale

(Continued from preceding page)

Excavation, unclassified, including rolling	541,204 cu. yds.
Excavation, structures	514 cu. yds.
Overhaul	358,610 cu.-yd.-sta.
Watering	3,788 M-gals.
Class A concrete	424.92 cu. yds.
Reinforcing steel	81,472 lbs.
Reinforced-concrete pipe, 15-inch	152 lin. ft.
Reinforced-concrete pipe, 18-inch	1,392 lin. ft.
Reinforced-concrete pipe, 24-inch	1,118 lin. ft.
Reinforced-concrete pipe, 30-inch	564 lin. ft.
Reinforced-concrete pipe, 36-inch	616 lin. ft.
Reinforced-concrete pipe, 60-inch	180 lin. ft.
Corrugated-metal pipe, 30-inch	262 lin. ft.

Personnel

The contract for this work was awarded on August 27, 1941, to the Jarvis Construction Co., Sioux Falls, S. Dak., and R. P. England, Murdo, S. Dak., by the South Dakota State Highway Commission. The amount of the contract was \$118,381.20 and 140 weather-working days were allowed for completion. In South Dakota a weather-working day means a day on which 50 per cent or more of the con-

tractor's equipment and man-power can be advantageously utilized in the prosecution of the contract. Good progress was made in the autumn of 1941, but after Pearl Harbor all construction was suspended. Dave Gustafson & Co. of Sioux Falls, S. Dak., took over the contract in 1945, and work was resumed on September 25. Claude Pasco was Superintendent for the contractor and T. J. Bunn, Resident Engineer, supervised the work for the South Dakota State Highway Commission, of which E. W. Meeker is Highway Engineer.

Barium Steel Expansion Includes Globe Forge

Control of Globe Forge, Inc., Syracuse, N.Y., has been acquired by the Barium Steel Corp., Canton, Ohio, as part of an expansion program which is expected to bring other concerns into the Barium group. During the past year Barium has taken over the Clyde Iron Works, Duluth, Minn., and the Erie Bolt & Nut Co., Erie, Pa.

Land-Clearing Bulletin

Clearing wooded or rocky land for highways, airports, farm land, and similar usage is graphically illustrated in an 8-page brochure issued by the Isaacson Iron Works, 2917 E. Marginal Way, Seattle 14, Wash. The folder presents a series of photographs showing the Isaacson Klearing Dozer in action.

A description of the operations and the features of the unit, together with tips on economical land clearing, accompanies the photographic sequence. The Klearing Dozer blade is interchangeable with the regular dirt blade of the Isaacson Trac-Dozer attachment.

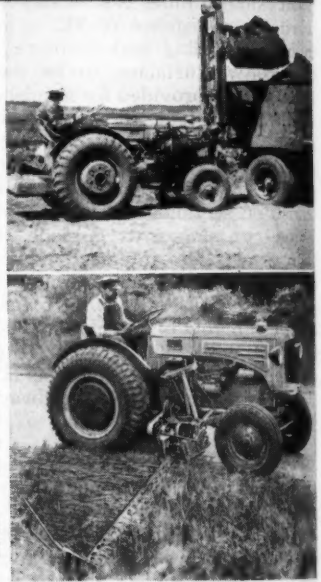
Copies of the folder, AD-1, can be secured direct from the manufacturer on mention of this notice.



ONE TRACTOR FOR MANY JOBS

MM Industrial Tractors . . . offered in 3 sizes from 27 H. P. to 64 H. P. . . . are ideal for heavy drawbar work pulling road maintainers, wheeled scrapers, sheeps foot tampers, and carry-alls, as well as for use with loaders, material buckets, snow plows, bulldozers, rotary brooms, street flushers, highway mowers, etc. Balanced weight and power for good traction and ease of handling, wide range of forward speeds, high speed reverse gear, and short turning radius make MM Industrial Tractors ideal for all-around drawbar work. Heavy front axle and tire equipment, heavy cast wheels front and rear, front power take-off drive for hydraulic or mechanical lifts, and special Ross steering gear with Twin lever adapt MM Industrial tractors for use with mounted attachments.

Complete specifications will be furnished on request. Also get facts on the new MM side-mounted highway mowers.



MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY

MINNEAPOLIS 1, MINNESOTA, U. S. A.

Parts readily available 2 Replacements easy, simple and quick

At some point in its service-life, every machine or accessory which is steadily employed requires a new part. Whether this be due to accident, abuse or ordinary wear, the important point is to be able to get the part in the shortest time and install it with the least possible delay, to minimize the cost of "down-time."

Recognizing the manufacturer's responsibility, the Twin Disc Clutch Company did two things:

First, Twin Disc engineers designed the diversified line of standard Twin Disc Clutches and Hydraulic Drives to make parts replacement simple, easy and quick.

Second, the Twin Disc Clutch Company has made replacement parts for its units quickly available either through those manufacturers who furnish Twin Disc products as original equipment or through the Twin Disc Clutch Company's 6 factory branches and 31 parts stations, covering all important industrial centers.

That's one reason why builders of all types of dirt-moving machinery say: "Let's standardize on Twin Disc Friction Clutches or Twin Disc Hydraulic Drives." TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Above: Power Take-off.
Below: Model E Clutch.



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

BROWNHOIST BUCKETS

Designed and built by Industrial Brownhoist Corp. do a better job

because, 1) Large Sheaves reduce rope wear, 2) Heavy Carbon - Steel digging lips take deep, clean bites, 3) Extra-sturdy construction insures long life. Write for complete facts to Industrial Brown-

hoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia Cleveland and Chicago.

BROWNHOIST BUILDS BETTER BUCKETS

Equipment Maintained At District Garage-Shop

Building With Facilities For Servicing 400 Units Used By Road Commission At Charleston, West Va.

THE large, well equipped, combined garage-shop of the West Virginia State Road Commission located at Charleston maintains over 400 pieces of equipment, from power shovels down to grass mowers, used in District 1 which comprises the five counties of Kanawha, Boone, Clay, Mason, and Putnam. The fifty-five counties in West Virginia are divided into ten highway districts, averaging five counties to a district, with a shop located at each district headquarters for major overhauls and repairs, and a smaller shop in each county for work of a minor nature which can be done with small hand tools. One maintenance mechanic is assigned to each of these smaller shops.

District 1 garage is located on a rectangular plot of ground, 270 feet deep and having a 160-foot front on Wilson Street, which also contains the state engineering office building of the Road Commission. The two buildings are separated by a 32-foot road, in the center of which a gas pump has been placed for refueling cars and equipment from both buildings. The lot is enclosed by a wire-mesh fence with gate openings at the south end leading into Wilson Street. Built in 1930, the garage is 228 feet deep x 37½ feet wide, with red-brick walls on which rest steel trusses set on 12-foot centers supporting a combination rubberized roof. The building has a concrete floor throughout, and the large yard which adjoins the structure on the east side is also paved with concrete. At the rear of the yard is a siding of the C. & O. Railroad.

Equipment and supplies have access to the garage through eleven manually operated overhead rolling metal doors, 10 feet wide x 12 feet high, built into the east wall. Good natural lighting is obtained from large windows placed in the west side of the building, extending 10 feet above the level of the work benches, which are set along this wall, and running almost the length of each bay. This lighting is augmented by a system of overhead electric lights, two being hung from the bottom of each truss. The building is heated by a No. 4 Ideal Redflash boiler burning natural gas, located in the basement of the engineering building just west of the garage. The steam heat is circulated through a unit system of blowers.

Across the front or south end of the garage is a stock room, 40 feet deep, separated from the rest of the building by a brick wall with a window at the center through which supply parts are dispensed to the mechanics. This section has a mezzanine floor, where tires are stored, but the rest of the garage is of single-story construction. Supplies are kept in metal bins and cabinets, and indexed on a Kardex system under class numbers or a code which signifies which parts are to be used for tractors, which for trucks, etc. As a part is requisitioned, it is checked off on the card.

Welding Shop

Immediately to the rear of the stock room is the welding shop extending the width of the garage and one bay or 12 feet deep, just large enough for the admission of any piece of equipment through the first of the rolling overhead doors in the east wall. A tarpaulin is strung across the north end of this section to prevent the welding flashes from disturbing those working in adjoining bays. Across the west wall of this room

is a metal work bench with a 200-pound anvil near at hand. Equipment includes an oxy-acetylene welding set, and a Lincoln 58-amp electric welding unit, while a similar unit is set up on a truck for use in the field on emergency repairs. The rest of the main shop is also serviced by two oxy-acetylene sets which are rolled around on rubber-tired carriages.

Machine Shop

Beyond the welding room is the machine shop, 50 feet deep, and stretching the width of the garage. Here such major work as grinding crankshafts, boring blocks, and rebuilding engines is done. This section is entered through the next two doors in the east wall going towards the rear of the building.



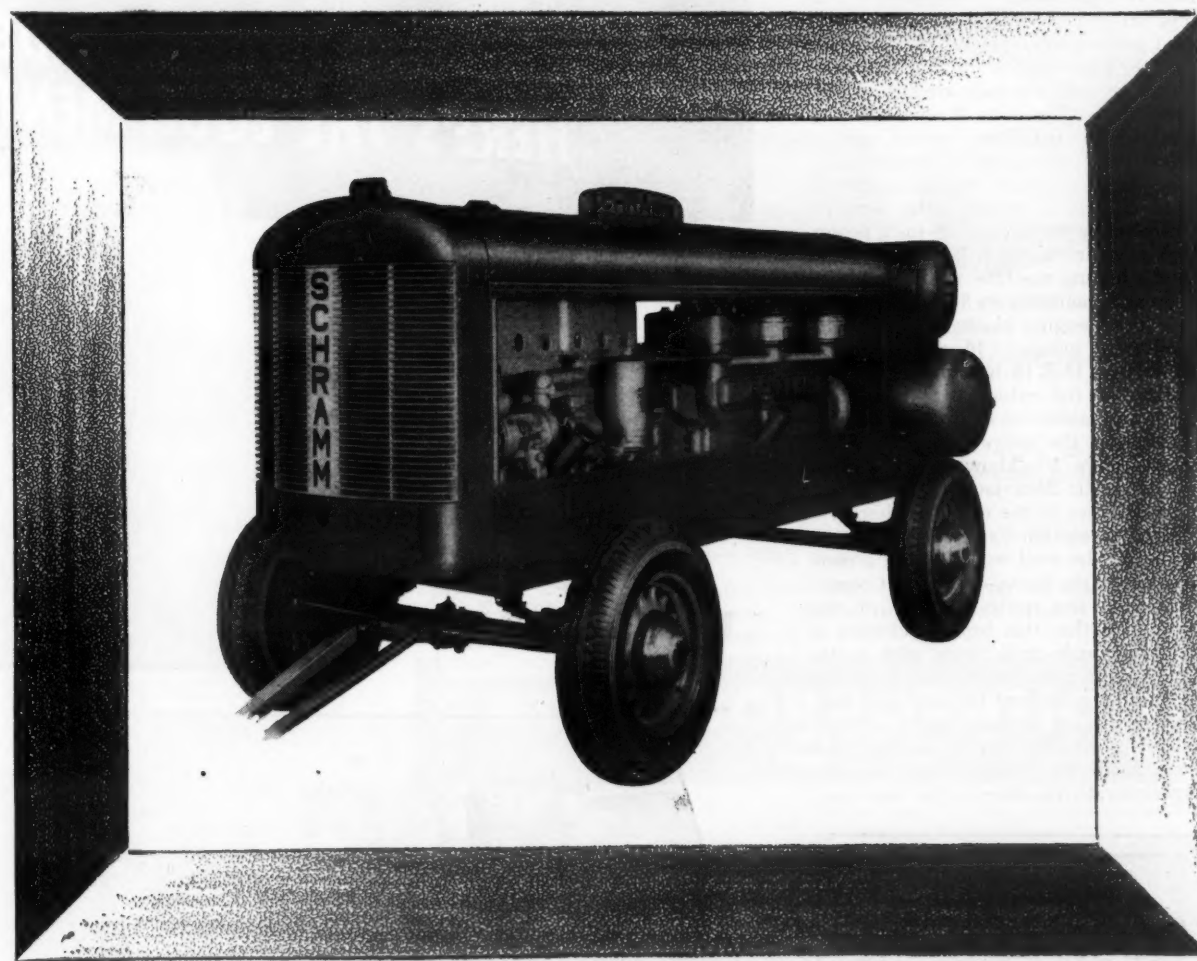
C. & E. M. Photo

The District 1 garage of the West Virginia State Road Commission maintains 400 pieces of highway equipment. This view of the east side of the main garage shows the overhead rolling doors for entrance to the shop from the concrete-paved yard.

Along the west wall are wooden work benches, 30 inches wide, which are cleaned off every night after work, while the tools and parts used during

the day are put away in cabinets beneath the bench. Bench equipment includes two Sioux heavy-duty ball-

(Continued on next page)



IN AIR COMPRESSORS

MASTERPIECES

THERE ARE TOO!

The superior features of Schramm Air Compressors put them in the "masterpiece" class. For that reason, behind compressed air jobs, there's usually a Schramm Compressor.

Schramm Air Compressors have these important features: (1) 100% watercooled; (2) Mechanical Intake Valve; (3) Forced Feed Lubrication; (4) Push-button electric starter.

Schramm Compressors are designed for

heavy duty, continuous service, with minimum attention. And, whether they are portable or stationary, they are lightweight and compact, and vibrationless!

No wonder they give "masterpiece" performance! And no wonder you will want a Schramm as your next Air Compressor! Make your next compressed air job a "masterpiece" by using Schramm. Write today for full details and data outlined in our new catalog.

SCHRAMM INC. THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

Equipment Maintained At District Garage-Shop

(Continued from preceding page)

bearing grinders, and two 6-inch vises, while on a nearby stand a Sioux valve-refacing machine and a Sunnen grinder are mounted.

At the center of the room, engines are rebuilt and reassembled on four wooden benches, 48 x 28 inches and 32 inches high, with four rollers on each bench so that they can be easily moved around to where the equipment is stationed. Running the length of this shop, hung from the trusses overhead, are two steel beams on which rides another beam supporting a Yale 2-ton hoist by which the heavy machinery is lifted and moved about. Before work is started on rebuilding an engine, the entire unit is first thoroughly cleaned with kerosene or gasoline, and after the job is finished the outside walls of the engine are painted before it is put back in the piece of equipment. A complete log is kept on each rebuilt engine, showing what parts were replaced.

At the north end of the machine shop the heavy machine tools are strung out, including an American 16-inch x 3-foot lathe with a contained power unit; a Brown & Sharpe shaper; a radial drill press with a 4-foot radius; a South Bend 16-inch x 12-foot lathe with its own electric motor; an 18-inch power hack saw driven by a 3/4-hp motor; a Landis honing machine which can bore up to and including an 8-inch-diameter hole in an engine block; and a Landis crankshaft grinder, 16 x 52 inches, driven by a G-E 15-hp motor. A Storm boring bar for cylinders is kept in a closet and taken out only when needed. Throughout the entire garage are scattered twelve Blackhawk Rollacar 10-ton hydraulic floor jacks.

To the rear of the machine shop is a bricked-in section extending to within 10 feet of the west wall, leaving a passageway to the heavy-equipment repair section to the north or rear of the garage. Within this brick enclosure is a 10-foot-wide tool room with metal bins in which the mechanics' tools are kept and charged out to them each day. The remaining 18-foot width of enclosure is divided into a lavatory and wash room on the west end, and the superintendent's office at the east end.

Heavy-Equipment Repair

Beyond these small rooms is the largest section of the garage, six bays long, each with a door through which heavy equipment is brought in for repairs. Along the west wall are five benches, 9 feet long, in each of the five bays, while along the remaining bay is a clothes locker. Over each bench is an electric light with a large reflector to spread the light along the work. Bench equipment includes a Black & Decker 8-inch grinder, a 6-inch, and an 8-inch vise. This section also has four work tables on rollers, the same size as those used in the machine shop, for engine overhauling. Overhead, to do the heavy lifting, are two Yale 5-ton hoists.

In the southwest corner of this shop, brakes are relined on a Raybestos brake-lining machine. Other equipment along the west wall includes a babbitt furnace heated by gas, and a Lemco 40-ton hydraulic press. In the northwest corner is a Chicago Pneumatic air compressor, size 7 1/2 x 6, driven by a G-E 15-hp motor, which delivers air

at 110-pound pressure through four outlets, located one on each side of this section, one in the machine shop, and the other placed outside the building.

A brick wall extends the full width of the building at the rear of this heavy-equipment repair shop, shutting off the last two bays at the end of the building from the rest of the garage. All the painting is done in this section which has two doors leading into it. One door gives entrance to a room, 12 x 20 feet, where equipment is painted with DeVilbiss spray guns, and the excess paint in the air is drawn off by a blower placed in the wall. The rest of this area is given over to sign painting.

Outlying Buildings

Off the northeast corner of the main garage is a 15 x 25-foot metal shed where equipment is greased over a pit by a Lincoln pressure greasing machine. Old crankcase oil is reclaimed here on a Youngstown-Miller oil purifier. Outside this shed is a Hypressure Jenny steam cleaner where equipment is thor-

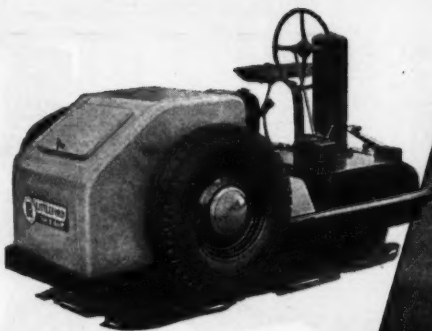
oughly cleaned before being taken in to the garage for repairs.

Also at the rear of the yard is a 10 x 20-foot wooden shed where radiators and batteries are serviced. Radiators are cleaned by immersing them in a metal tank, 48 x 20 inches x 40 inches deep, containing a caustic solution which is heated to the boiling point over a gas heater. This tank is placed outside at the rear of the shed, while inside the building is another tank, 40 x 35 x 12 inches deep, for rinsing. This shop is also equipped with a Black & Decker 7-inch grinder, a Champion spark-plug cleaner and tester, and a Unitron rectifier for charging batteries.

At the northwest corner of the yard is a corrugated-metal and wood building, 33 x 21 feet, used as a blacksmith shop. Here are located a 6 x 4-foot forge with an electric blower, and a 200-pound anvil. At the center of the room is a metal work table, 6 inches thick, measuring 5 x 3 feet. On one side of the shop is a work bench, 10 feet long

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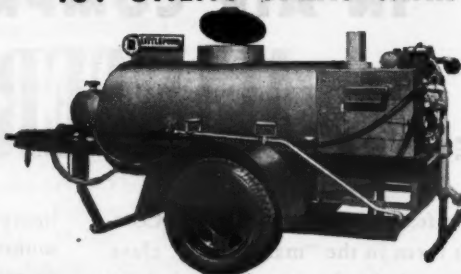
WHEN ROAD REPAIR IS NEEDED HERE'S THE EQUIPMENT FOR THE JOB



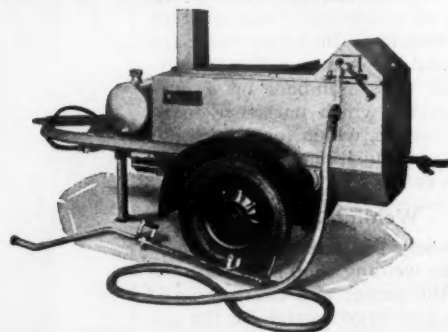
TRAIL-O-ROLLER



101 UTILITY SPRAY TANK



84-HD ASPHALT KETTLE



These Littleford Units are the modern efficient, low cost operating units, designed for the big road repair program ahead. The 84-HD is the fastest heating Kettle made today, having patented Littleford features.—The 101 Utility Spray Tank combines three units in one.—Trail-O-Roller is the portable roller that gives as much compaction as a five ton tandem.

With units like these on the job, it's easy to get that repair job done permanently. Littleford Equipment has been tried and tested—make no mistake when you purchase your next repair outfit—make it a Littleford.



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Low Cost Per Ton-Mile

Manganese Tracks

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Sturdy Construction

5 to 50 Tons Capacity

Negotiates Steep Grades,
Mud, Snow and Ice

For

Mining • Quarrying • Logging
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Airport and Oil Field Work

The Linn Manufacturing Corporation
Morris, New York

Designers and Builders of
Off-Highway Vehicles

Equipment Maintained At District Garage-Shop

(Continued from preceding page)

x 3 feet wide; on which are mounted an electric grinder and a 6-inch bench vise. A Canedy-Otto 12-inch radial drill rounds out the equipment.

At the center of the yard is a concrete loading platform 40 feet long x 12 feet wide. Starting at ground level a ramp rises gradually to a height of 4 feet at the other end, over a level area 12 feet long, from where equipment can be pushed on a flat-bed truck or a trailer. Heavy equipment is usually brought to and from the shop on a 20-ton trailer which is pulled by a truck. The transfer of such equipment is easily handled at this platform and ramp.

A carpenter shop has been set up in a room in the basement of the engineering building, where maintenance work on truck cabs or station wagons is handled. Equipment includes a 3½ x 7-foot layout table, a Craftsman table saw

with an 8-inch circular blade, and a Craftsman 15-inch band saw. Adjoining this shop is a locker and shower room for the use of all the garage employees.

Personnel

The forty employees of this garage have been kept busy throughout the war years trying to maintain the equipment of the district and keep it in shape, since no new equipment has been purchased since 1941. Careful repairs have helped to prolong the life of much equipment which had already reached the age for scrapping.

J. E. Wallace is Superintendent of the District 1 garage at Charleston, and C. G. Christian is District Engineer. E. L. Worthington, formerly State Maintenance Engineer, is now Commissioner of the West Virginia State Road Commission.

Funds are essential for the Red Cross to finish its war job and meet its peacetime obligations. Please give!

Anthony HAS IT...

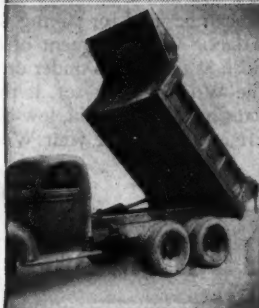
CONSTRUCTION EQUIPMENT THAT KEEPS TRUCKS ON THE MOVE

- ANTHONY "SUPER" HYDRAULIC HOISTS AND BODIES, up to 30 ton capacity — with "power speed lift" and "rubber restraining blocks," two of many features that explain the evident preference for Anthony equipment on the job.
- ANTHONY HYDRAULIC LIFT GATE... one of the remarkable new war-developed pieces of equipment for loading and unloading. Raises and lowers loads from ground to truck level.
- ANTHONY MATERIAL SPREADER... rugged, all steel; for road building, maintenance and ice control.
- ANTHONY HYDRAULIC PLATFORM "BOOSTER" HOISTS, especially designed to make dump bodies out of flat bed trucks.

Write for complete details on any Anthony product. Available through all truck dealers and Anthony distributors.

ANTHONY
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Subgrader Literature

Features designed to provide operating economy are built into the Standard-Lewis subgrader, which will operate in either direction, has a sectional stationary cutting blade adjustable to any desired subgrade contour, and will

clear obstacles within 12 inches of the pavement line.

An 8-page folder showing these and other Standard-Lewis features can be obtained by CONTRACTORS AND ENGINEERS MONTHLY readers who write to the Standard Steel Corp., 5001 So. Boyle Ave., Los Angeles 11, Calif.

SPEED OUTPUT with GATKE SWING FRICTIONS



GATKE moulded Swing Friction for a NORTHWEST Shovel. Available for all models.

TREMENDOUS POWER—for effortless control—no let down when things get hot.

SMOOTH ACTION—for precision inching—no grabbing or chattering.

LONG WEAR LIFE—beyond comparison.

... These are some of the reasons why GATKE Swing Frictions help get the job done FASTER. Try them and compare results!

Moulded to finished dimensions in all shapes and sizes—LARGE or small.

Shipped from stock for popular shovels, cranes, hoists, etc. Just tell us what you need or send for literature.

GATKE QUALITY BRAKE LINING & CLUTCH FACINGS are made for ALL applications

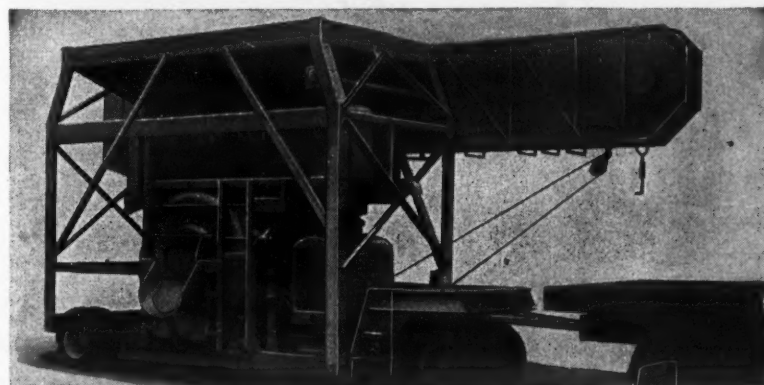
Non-Metallic Bearings to Replace Bearings of Critical Metals

GATKE CORPORATION

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Chicago, Ill.



ERIE Strayer PORTABLE CONCRETE PLANT

combines in one portable unit—2 or 3 compartment storage bin—bucket elevator—AggreMeter unit to weigh batch in 15 seconds—water tank and proportionater—batching meter—pre-mixing cement feeder.

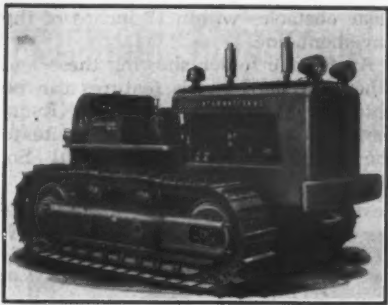
Write for booklet to 263 Geist Road.



ERIE STEEL CONSTRUCTION CO.

ERIE, PENNSYLVANIA

Aggre Meters • Buckets • Concrete Plants • Traveling Cranes



The latest International tractor is the 130-hp diesel TD-24.

International Adds Heavy Diesel Tractor

The first of several additions to the line of International industrial power equipment, the TD-24 TracTracTor, was unveiled during the meeting of the Associated Equipment Distributors at Chicago. Largest tractor ever built by International Harvester, the TD-24 weighs 35,000 pounds, and has a 130-hp drawbar rating. It will be produced at the firm's newly acquired Melrose Park Works in suburban Chicago.

The new crawler tractor is powered by an International 6-cylinder full-diesel engine. It features a built-in gasoline starting system in addition to the electric starter. Eight speeds, ranging from 1.6 to 7.8 mph, together with fast gear changing, is expected to speed up the round-trip time cycle of the TD-24. Other features include a new type of steering, special sealing and anti-friction bearings in track rollers to extend the lubrication period, and convenient mounting for allied equipment.

More complete details concerning the new TracTracTor may be obtained by

writing to the Industrial Power Division of the International Harvester Co., 180 No. Michigan Ave., Chicago 1, Ill., and mentioning this news story.

New Diesel Welder In 300-Ampere Range

The addition of a new 300-ampere diesel-driven welding unit to its Shield-Arc line has been announced by the Lincoln Electric Co., Box 5758, Cleveland 1, Ohio. Powered by a 2-cycle engine, the unit is said to result in fuel-cost savings. Compactly built, its rugged design utilizes structural and pressed steel.

A simplified fuel arrangement with complete fuel filtering system features the engine. Dual continuous control on the welder permits the operator to select any type of arc and intensity for his job, making for ease, speed, and a wide range of application. The welding-current range is from 20 to 40 volts, 60 to 375 amperes. The new Shield-Arc is a stationary model, but can be mounted for easy portability. Optional equipment includes spring-balanced running gear of the automobile trailer type with four pneumatic-tired wheels.

Further information on this welder may be obtained direct from the manufacturer. Just mention this item.

P. C. Reilly Honored

A dinner marking the fifth decade of his business operations was tendered Peter C. Reilly, founder and President of the Reilly Tar & Chemical Corp. and the Republic Creosoting Co., during a conference of branch managers, sales representatives, and home office executives at Indianapolis recently.

Steel Concrete Forms

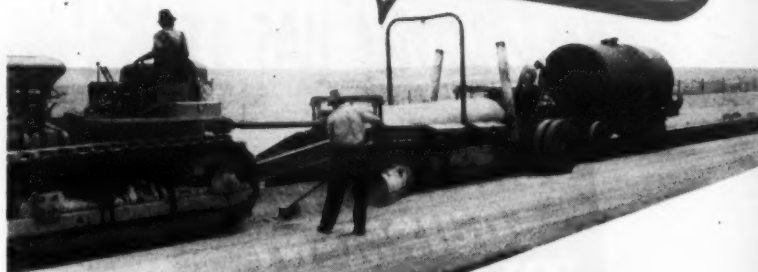
Contractors planning their equipment set-ups for the coming construction program will be interested in a series of bulletins on steel forms for highway, airport, and other concrete construction, issued by the Heltzel Steel Form & Iron Co., Warren, Ohio. Copies

may be procured by readers of CONTRACTORS AND ENGINEERS MONTHLY who write Heltzel and mention this notice.

Bulletin A-20-F gives general details on Heltzel forms for use in curb, gutter, and sidewalk work. Dual-duty airport forms are shown in Bulletin B-19-A, and the Heltzel adjustable stake brace in T-27-B.

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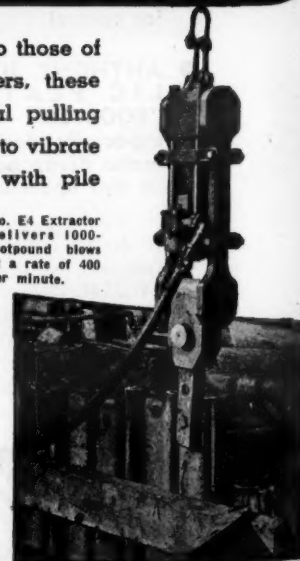
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The Gradall is a new type of grading machine with an expandable boom, to be made and sold by the Warner & Swasey Co.

New Grading Machine Has Expandable Boom

Entering the road-machinery field, the Warner & Swasey Co., Cleveland machine-tool manufacturer, has announced the start of production of a new grading machine. Known as the Gradall, the unit was invented by Ray Ferwerda, a Cleveland contractor. It is said to permit earth moving in places not ordinarily accessible to the conventional types of excavating equipment. Operated hydraulically, the Gradall has an expandable 24-foot boom of arc welded construction in which are utilized the welding technique and experience gained by Warner & Swasey in building wartime radar antennae.

Five of the machines have been undergoing rigid field tests for some time. Production is just getting under way, the firm says, and the Gradall is expected to be ready for the market by the middle of the year. Distribution will be through regular road-machinery outlets, rather than through the W & S machine-tool sales force.

Full details concerning this new grading machine may be secured by writing to the Warner & Swasey Co., Carnegie & Stillwell Aves., Cleveland, Ohio. Say you saw it in CONTRACTORS AND ENGINEERS MONTHLY.

Sealed Electric Motor Described in Bulletin

Motors for use in dusty locations, places where excess moisture abounds, or for general-purpose work are illustrated in a new bulletin on Sealedpower motors, issued by the Crocker-Wheeler Division of the Joshua Hendy Iron Works. Sealedpower motors, available in sizes from 2 to 15 hp, are ac, totally enclosed, and fan-cooled.

In addition to a detailed description of the motor's features, the illustrated 4-page bulletin includes a cutaway view and pictures of various applications. Laboratory tests made before the

the Crocker-Wheeler Electric Division, Ampere, N. J., and mention this notice.

New Vulcanizer Gives More Definite Pressure

Of interest to shop maintenance men and others who repair tires is a new type of Match Patch vulcanizer announced by the J. W. Speaker Corp. The new product is said to eliminate guesswork insofar as accurate vulcanizing pressure is concerned. Pressure is automatically predetermined by toggle action, "bellows-principle" wings, and a rubber cushion that gives upward counter thrust. This compensates for the varying thicknesses of tube rubber.

The new V-65 Match Patch vulcanizer has eight-bearing rocker arms said to insure smooth action. A swing-down tube last enables the operator to perform even the buffing operation on the machine. A deep throat admits large tubes for proper centering, and specially designed spiders allow ventilation



The Match Patch vulcanizer is designed to eliminate guesswork in determining accurate vulcanizing pressure.

for fuel combustion. Made of heavy-gage steel, the V-65 is designed for vulcanizing-type replacement valves, small and large patches, oval or round.

Further details concerning the V-65 Match Patch vulcanizer may be obtained from the J. W. Speaker Corp., 3059 N. Weil St., Milwaukee 12, Wis.

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● Like a college letter, the AGC rating plate isn't given to just anyone. Only the mixer or paver that has proved itself can wear it. In the words of the plate, the equipment must "guarantee to hold and properly mix a specified number of cubic feet of concrete plus 10% when operating on the level."

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The T. L. Smith Company
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With patent gear change and positive internal brake that never fails, and will lock load.
Gear Ratios: Weight Price
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A Big Grading Job For Concrete Paving

(Continued from page 2)

Joints

The two 12-foot slabs are tied to each other longitudinally by ½-inch round deformed bars, 4 feet 6 inches long, set at mid depth of the pavement on 5-foot centers. The bars were bent to form a right angle at the center point and, in pouring the first 12-foot lane, half the bar was laid out flat against the form and protected from the concrete by a Bell V-type cover. These metal guards are 5 feet long and were supported at mid height of the form every 4 feet by steel pins which were left in the concrete. When the steel form and guard were removed from the slab, each bar was covered with a 3-foot length of hose to protect the steel from the bituminous curing agent with which the slab was sprayed. This kept the rod clean so that when it was straightened out it would bond well with the concrete in the adjoining slab.

Set every 122 feet are ¾-inch-thick asphalt-impregnated felt expansion joints supported on a Dow-Weld joint assembly. The expansion material, which is 12 feet wide and 8¾ inches high, is pierced along the center by twelve ¾-inch round slip-dowel bars, curved downward to form a 5-inch loop at the side nearer the paver and straight on the other side. The bars on the latter side were oiled and covered with a metal sleeve. At the bottom of the assembly on the curved side of the dowels is a 1½ x 1½ x ¼-inch steel angle, running the width of the joint to stiffen the expansion material which was also capped on top with a steel channel. Each dowel was also supported at the curved end by a ½-inch round x 12-inch-long pin driven into the ground and left there.

Midway, or 61 feet, from each expansion joint were set Bethlehem Steel Co. contraction joints, consisting of an 18-gage steel plate, 8¾ inches high x 12 feet wide. Like the expansion joints, they also had a steel cap which was removed after all the machine finishing was complete.

Batching Plants

Two batching plants were used on these contracts, one to supply weighed batches for the bridges and structures, and the other for the paving. The batch plant for the bridges was set up first on a two-track siding that had been built off the Reading railroad just north of Jonestown at about the center of the entire job. Equipment at this plant included a Blaw-Knox 105-ton aggregate bin through which passed coils of pipe for heating the sand and stone during winter concreting operations. Water was heated in a 1,000-gallon tank supported on a wooden trestle so that the eight Rex Moto-Mixers, mounted on International trucks, which were used on the smaller bridge pours could obtain the water by gravity flow as they passed under the bins. Live steam for the pipes was furnished by a coal-burning horizontal boiler. A MultiFoote 27-E paver was used on the larger bridge pours.

Sand was purchased from Warner Bros. in Philadelphia and shipped 80 miles over the Reading railroad to the siding. If the sand came in hopper-bottom cars it was unloaded into a pit beneath the tracks, while if the shipment was made in gondola cars the sand was unloaded by a Link-Belt Speeder crane with a 60-foot boom and a Haiss 1-yard heavy-duty clamshell bucket, and stockpiled. Stone was purchased from the Calcite Quarries at Lebanon, Pa., which delivered it to both batch plants after a 10-mile average truck haul.

Cement was shipped in bulk and unloaded at the siding through a canvas funnel into an enclosed trough beneath the track, through which ran a screw that carried the cement to an enclosed bucket elevator. The cement was lifted on this elevator to a Blaw-Knox 300-barrel bin where it was stored for use in the paving. One hundred feet away from this cement storage was a smaller unit, a 100-barrel Blaw-Knox bin, which was loaded in the same manner. The smaller plant held the cement used in the bridges and structures. For the pavement, 37,000 barrels of portland cement and about 22,000 barrels of air-entraining cement were used.

The separate batch plant for the paving operations was first set up at the intersection of the old and the new road about a mile west of Fredericksburg, in order to keep the distance the batch trucks had to haul as short as possible, since paving was started at the east end of the project. As this plant was not on a railroad, the sand was hauled in trucks about 5½ miles from the plant

on the railroad siding, and stockpiled alongside a Blaw-Knox aggregate bin which had its capacity increased by the addition of sides from a normal 105 tons to 140 tons. The stone, which was hauled directly from the source of supply in trucks, was stockpiled on the other side of the three-compartment bin, and enclosed by a wooden bulkhead to keep it from spreading over too large an area.

Cement for this plant was hauled from the cement storage bin at the railroad siding to the paving batch plant in two White trucks, which were fitted out with a special top made from a wooden frame covered with tar paper. Two holes were cut in the top so that the 32-barrel load of cement, which each truck carried, could be evenly distributed. At the plant the trucks backed up a small ramp and dumped the cement into a hopper enclosed in a wood-frame paper-covered shed, from where it was carried by a screw and enclosed elevator to a 300-barrel Blaw-Knox cement bin. When not in use, the front of the shed which housed the

hopper was covered with a canvas tarpaulin to keep it dry, and prevent cement from blowing about.

Concrete Batches

About 500 tons of each of the two sizes of stone used in the concrete paving was always on hand in the stockpiles, as was about 1,000 tons of sand. Each of the materials was kept in two separate piles so that one pile had always been exposed to the elements for at least 18 hours. This precaution was taken so that the sand and the two grades of stone would have a uniform surface moisture content; the piles which were to be used the next morning were generally wet down the night before.

The aggregate bins were loaded by a Marion crane with a 60-foot boom and a Williams 2-yard clamshell bucket, which was served by an Allis-Chalmers tractor-digger. An average of ten White trucks, each carrying three 1½-yard batches, were loaded with sand and

(Continued on next page)



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SAVE TIME. Quickly made stock piles ready for immediate use without frequent fresh mixes.
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A Big Grading Job For Concrete Paving

(Continued from preceding page)

stone by driving under the three-compartment bin equipped with beam scales, and then received the cement quota in their Stevens Turn-O-Matic cement boxes as they drove under the cement bin. These cement boxes insured the full amount of cement getting into each batch since they were kept closed until the whole batch was dumped into the paver skip.

The average haul to the paver from this location was around 2 miles, but when the time came to pave the western half of the project the batch plant was moved to the vicinity of Jonestown. The rest of the job was paved with the batch plant in this location, which meant a slight increase in the average haul of the batch trucks but a lessening in the travel distance for the trucks supplying the sand and cement.

The gradation of the coarse and fine aggregate follows:

Sieve Size	Per Cent Passing		
	3A Stone	2B Stone	Sand
2½-inch	100	.....	.....
2-inch	90-100	.....	.....
1½-inch	35-70	.....	.....
1¼-inch	.....	100	.....
1-inch	0-15	90-100	.....
¾-inch	.....	20-50	.....
¾-inch	.....	.....	100
No. 4	.....	0-10	95-100
No. 20	.....	.....	35-65
No. 50	.....	.....	5-30
No. 100	.....	.....	0-8

A typical batch had the following weights:

Standard cement, 8.6 bags	808.4 lbs.
Sand	1,787.0 lbs.
2B stone	1,409.6 lbs.
3A stone	1,404.0 lbs.

The amount of water needed for each batch was 45.6 gallons or 5.3 gallons to the bag of standard cement. As the surface moisture of the aggregate in the above typical batch was computed to be 8.8 gallons, only 36.8 gallons of water was added at the paver. This batch yielded 1.38 cubic yards of concrete having a slump between 1¾ and 2 inches. With the air-entraining cement, 5.0 gallons of water was used and the amount of sand was reduced to 1,642 pounds.

Paving Operations

The use of three-batch trucks instead of the customary two-batch bodies caused the batches to be heaped higher, with a tendency to spread further when dumped. Because of this, the skip on the new Rex dual-drum 34-E paver was enlarged by welding a 2-foot extension along the front and 8-inch plates along the sides, to prevent the batch material from spilling. The batch was mixed in both drums a total of 1½ minutes, from the time the skip was raised until the concrete poured out into the single-gate discharge bucket. This included the transfer time between drums which revolved at a speed of 15 rpm. Most of the operations on this paver are automatic, with the skip raising itself every 29 seconds as soon as the first drum became empty, but the dumping of the concrete along the 34-foot boom was controlled by the operator.

As the graded roadway was plenty wide, the paver had ample room to work outside the forms, and to take on water from any of four White trucks, each carrying a 1,000-gallon tank, filled from Jonestown fire hydrants. Transfer from these tanks was made by a 3-inch centrifugal pump on the paver.

As the concrete was dumped on the subgrade, it was leveled off by the paddle on a Blaw-Knox spreader, while two puddlers in the pit kept the material in front of the machine. The adjustable paddle was set at a depth of 1¾ inches below the top of the forms, so that when the mesh reinforcement was placed by two men working out-

side the forms, it gradually worked down to the required 2-inch depth below the top of the slab. The final position of the mesh was confirmed in all cores that were taken. The mesh reinforcement came in 16-foot lengths which were lapped 12 inches. Made from No. 0 gage steel, the bars had a longitudinal spacing of 12 inches and a lateral spacing of 6 inches.

Following the spreader came a Blaw-Knox double-screed finisher and a Koehring Longitudinal Finisher. The slabs were spaded at the sides and joints, but no vibration was done, in accordance with specifications.

Finishing and Curing

Seven men worked on the finishing besides the machine operators. They removed the caps on the expansion and contraction joints from their 4-wheel traveling bridge that followed the finishing machines, and edged the joints with a ¼-inch-radius tool, and the outside edges of the slabs with a ¾-inch-

(Concluded on next page)

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A Big Grading Job For Concrete Paving

(Continued from preceding page)

radius tool. A burlap drag was then pulled lengthwise along the slab, but the surface was not broomed.

Curing was done with a cut-back asphalt applied at the rate of 0.05 gallon to the square yard as soon as the concrete took its initial set and the free water disappeared. Later, when the forms were removed, the sides of the slab were also machined-sprayed. Two men operated the Thompson Products Co. machine, one pulling and the other applying the curing agent supplied by the Seaboard Asphalt Products Co. of Baltimore, Md.

On the day following the pour the cracks were filled with tar heated in a portable Hauck kettle with a kerosene torch. By doing this immediately, the contractor saved the time and labor of cleaning out the cracks later after they had become filled with dirt.

Although the equipment was capable of turning out 250 feet of 9-inch concrete, 12 feet wide, per hour, the heavy rains in the spring, together with the labor shortage, retarded the development of the smooth-working crew upon which any record performances depend. The best day was on July 4 when 2,480 feet of concrete was laid in 11 hours; the ordinary shift was 9½ hours.

Median Strip

The 4-foot dividing strip which separates the dual-roadway pavements was built by subcontractor Polselli & Angelucci of Philadelphia, Pa. A ¼-inch expansion joint was placed along each inside edge of the pavement and against this was poured a 15-inch-wide lane of 8-inch concrete. The remaining 18 inches at the center was poured as a concrete curb 6 inches in depth, the top of which is 5 inches above the pavement. A 1-inch layer of white cement mortar was spread on top of the 15-inch-wide sloping curbs when the concrete was still green, and then scored with a special tool to give it a fluted appearance. This tool, with a ½-inch round handle, is 12 inches long x 1¾ inches wide and leaves a series of scoring marks 1½ inches wide. A final finish imparted a smooth surface to the reflecting curb.

Quantities and Personnel

The major items included in the three contracts were as follows:

Item	Amount
Excavation	1,017,066 cu. yds.
Concrete pavement, including reinforcement and joints	236,168 sq. yds.
Concrete for bridges and structures	13,356 cu. yds.
Reinforcement for structures	1,555,119 lbs.
Structural steel, plain	42,680 lbs.
Structural steel, fabricated	80,200 lbs.
1½" underdrain, 4-inch	55,200 lin. ft.
White concrete reflecting curb	54,992 lin. ft.
Subgrade drains	59,600 lin. ft.
Reinforced-concrete pipe, 15 to 72-inch	17,408 lin. ft.
Slag insulation course, 6-inch	56,719 sq. yds.

For Potts & Callahan, the contractor, W. Y. Potts was General Superintendent, H. M. Scott, Superintendent on bridges and pavement, and P. W. Turner, Jr., was Engineer. The three Superintendents assigned to the individual contracts were C. L. Shrodes, C. L. Crawford, and C. Loewer.

The completion of this 9.6-mile section of U. S. 22 from Harpers Tavern to Fredericksburg extends the improvement of this route which was started in 1944 with the 15-mile paving of two lanes from Paxtonia to Harpers Tavern,

one of the largest concrete paving jobs in the country that year. Two lanes will be added, at an estimated cost of approximately \$1,000,000, to this originally planned four-lane highway, which was graded and drained for the full roadway width. Eventually the gaps in the dual roadways on the 9.6-mile project will be filled in to complete the four lanes east of Harrisburg through Dauphin and Lebanon Counties, a distance of 26 miles.

Veteran 'Cats' in Action

Still going strong after 15,000 to 50,000 hours in action, is the mark set by a number of veteran Caterpillar diesel units shown in an illustrated 24-page color booklet just issued by the Caterpillar Tractor Co. The booklet, "Diesels With Endurance", highlights the durability and versatility of performance of these units in a wide variety of construction and maintenance jobs.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may obtain copies of

this new booklet, Form 9092, from the Caterpillar Tractor Co., Peoria 8, Ill.

Battery Power Used In Emergency Welder

Designed for emergency welding at isolated locations, a new portable arc welder has been announced by the Winpower Mfg. Co. The 200-ampere 32-volt dc Champion is powered by a set of four rubber-case batteries. Having a welding range from 20 to 200 amperes, Model 200 is built with Nichrome wire windings to withstand high temperatures and provide a uniform weld. The heavy-duty 8-volt 21-plate batteries can be recharged, three cells at a time, with any battery charger. Standard equipment with the welder includes a helmet, electrode holder, 50 feet of welding cable, and 5 pounds of general-purpose welding rod.

Full details on the Champion Model 200 may be secured by writing to the Winpower Mfg. Co., Newton, Iowa.

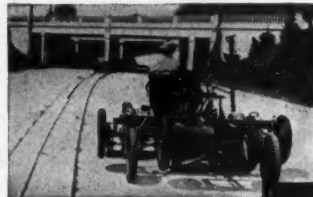
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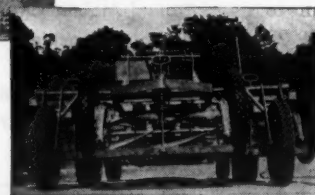
The Worthington "Highway Ranger" saves your department time and money — cuts everything from coarse grass shoulder grades to clover-leaf centers and grass on island stretches — maintains cut to the conditions you want.

The "Highway Ranger" is designed specifically to meet your varied mowing problems — embodies the same general characteristics as the famous Worthington Airfield Grass Blitzzer. With the Worthington "Highway Ranger" you are not wedded to any one make of tractor or sickle-bar attachment. It can be quickly attached to *any make* of tractor, or readily "switched" from one to another.



The "Highway Ranger" takes its place in traffic, like any other vehicle, and travels from one mowing area to another at the highest recommended speed of your tractor.

The "Highway Ranger" cutting rank growth on road shoulder. The "Ranger" method offers far greater cutting capacity than the sickle-bar method.



"Ground eye" view of the "Highway Ranger" raised for transportation. Ample clearance is provided for climbing curbs and for maneuvering in tight areas and around obstructions.



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Wood-Pile Dikes Aid Channel Maintenance

Built at Right Angles to Mississippi River Banks; U. S. Engineers Replace Dikes Washed Out by Flood

THE U. S. Engineer Department has an unusual assignment in that portion of the Mississippi River between Cairo and Alton, Ill., as the Department is charged with maintaining a 9-foot channel while the construction of the permanent channel is under way. Maintaining a navigation channel in a river carrying great quantities of sediment, like the Mississippi, is an unending problem. Above Alton, Ill., where the river is not so wide, a series of locks and dams has practically changed the stream into a great canal on which tight controls can be applied with respect to width and depth of channel. Below Alton, however, where the Missouri joins the Father of Waters, a system of open-river regulation prevails. In that 175-mile stretch between St. Louis, just south of the confluence with the Missouri, and Cairo, Ill., where the Ohio River empties in, the St. Louis, Mo., U. S. Engineer Office has constructed a great number of wood-pile dikes jutting out perpendicularly from the river banks to help in the unceasing work of keeping the channel open.

These pile dikes slow up the flow of water, resulting in a deposition of sediment both above and below the dikes. As this sediment is deposited, willows start growing on the newly formed bars and cause further deposition until a new bank line is created near the riverward end of the pile dikes. This constriction of the channel results in greater depths and a more efficient hydraulic cross section. In addition, all sediment trapped by the pile dikes does not form shoals in the main channels from which they would have to be removed. So effective have these dikes become that the number of dredges which were employed in this district for pumping out shoals has been reduced from seven to two.

During 1945 seven contracts were under way in this District for the construction of wood-pile dikes between Cairo, Ill., and the Chain of Rocks Bridge at St. Louis, Mo. One of these contracts was awarded to the Massman Construction Co. of Kansas City, Mo., on its low bid of \$329,506 to build ten dikes with a total length of 6,005 feet, all on the left bank or Illinois side of the Mississippi, with individual lengths of dike varying from 330 to 1,190 feet. The dikes were separated into groups of four, three, and three, and were spread over a distance of 26 miles, from a point above Fort Chartres, Ill., north almost to the Jefferson Barracks Bridge below St. Louis.

The Flood Came

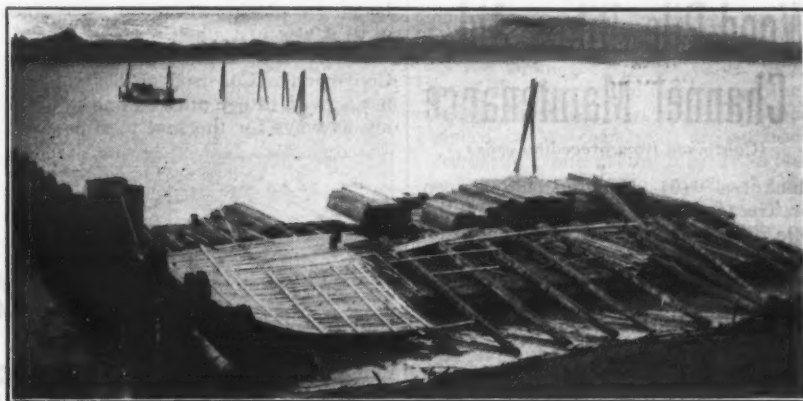
Work was started in September, 1944, on the middle series of three dikes, located opposite and slightly above Kimmswick, Mo., and about a mile below where the Meramec River joins the Mississippi on its west bank. Inclement weather and unfavorable river stages closed down construction in December, 1944, and during the spring of 1945 the Meramec rose to its highest flood stage in 30 years. The sudden pouring of this increased volume of water into the Mississippi resulted in a great scouring of the opposite shore near two of the dikes. About an acre of land along 200 feet of bank was washed away, and the inshore ends of two of the three dikes went with it.

Not until the middle of summer did the waters subside. Then in July the contractor resumed work on the other

dikes, while a U. S. Engineer force hastened to repair the damaged sections of the two dikes which were lost so that the area washed away would be filled in again before the next high water. Both the contractor and the U. S. Engineers completed their assignments in September, 1945.

Work in Stages

The construction of a wood-pile dike consists of five stages: (1) Laying a foundation or main-line mattress on the bed of the river along the line of the dike in order to prevent scouring of the bottom through turbulent eddy action which might result in the loss of some piles. This wooden-lattice mat arrests such scouring and prevents the piles from being washed away in that period



C. & E. M. Photo

Mats for wood-pile dikes in the Mississippi are assembled on barges. Here is a screen mat on an 80-foot barge of the Massman Construction Co.

before enough material is deposited out of suspension to build up a solid foundation around the piles. (2) Driving and clumping the piles. (3) Strengthening the pile clumps with piles used as horizontal stringers. (4) Connecting

the dike to the river bank by means of a shore mattress, two lines of single piles, and a 4 to 6-inch blanket of crushed stone followed by a layer of riprap stone approximately 12 inches in

(Continued on next page)

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Wood-Pile Dikes Aid Channel Maintenance

(Continued from preceding page)

thickness. (5) Hanging the screen mattress on the upstream side of the pile dike to effect the rapid deposition of silt by slowing the flow of the river, and dropping stone around the pile clumps where the foundation mattress was broken during the driving of the piles.

The crew for the work done by the U. S. Engineer forces consisted of nine men with a pile-driving barge rig and two auxiliary steel flat barges. The sections of dikes being replaced were 150 feet long and the foundation mat was woven 75 feet longer, with the extra width extending out in the river as an added protection against scouring at the end of the dike where the current is swifter and the water deeper. The mat is 70 feet wide and was anchored with one-third of this distance, or 23 feet, upstream of the center line of the dike, and the remaining 47 feet of width on the downstream side, since the greater scouring action takes place below the center line of dike.

All mattress work was done by hand on the barges, using 1 x 4-inch boards varying in length from 10 to 20 feet. Construction began by securely fastening three or four thicknesses of boards together every 3 feet with a 20d nail and one 4-wire strand to form the bottom half of a head block or header. This header extended the full width of the mattress, with the boards in each layer having butt joints broken not less than 3 feet from those of succeeding layers.

Boards called weavers were laid on the bottom half of the header, at right angles to and projecting 6 inches beyond the header, and spaced about 3 feet 8 inches, center to center, so that a 12-foot board lapped over 2 inches or more on any four consecutive weavers. Weavers were extended the length of the mattress by lap-splicing not less than 3 feet, and secured near each end of the lap and at the header by a 10d nail and one 4-wire strand.

The main body boards were woven parallel to the header, under and over the weavers, in courses not more than 4 inches apart. Weaving progressed simultaneously from the inner and outer edges of the mattress, with boards shifted to avoid a continuous line of splices. Double thicknesses of boards, called top boards, were laid on the woven boards directly over the weavers, breaking joints with them and with adjacent top boards.

The header was completed by placing the top half, made up of two to four thicknesses of boards, and constructed similarly to the bottom half, on the top boards, directly over the bottom half and breaking joints with it. A second header was constructed 5 to 10 feet further on to provide connection for anchorages. Double or triple thicknesses of boards were laid at right angles to and across the top boards for the entire width of the mattress to act as stiffeners and cross binders. The mattress was also strengthened by a system of 3/8-inch transverse and longitudinal strands made continuous through the width and length.

Sinking the Mattress

As work on the mattress progressed, anchor piles with spacing varying from 20 to 75 feet, according to the depth of the water, were driven in a line 100 feet above the dike. The mattress was attached to these anchor piles by cables so that it would be held in position until after the pile dike was constructed. The barge with the mat moved out slowly from the shore, laying the wooden mat as it went and as fast as additional sections were built. The mattress was bal-

lasted by placing stone on its surface until it was just afloat.

In this type of work, the Massman Construction Co. used an 80-foot-long barge, with fifteen piles off one side acting as ways for the mat to slide from.

When properly ballasted, the mattress was sunk to the river bed by the use of additional one-man stone weighing 60 to 80 pounds, cast from the barge as it swung over the mattress. The lines were slackened so the mat could sink

slowly to the river bottom without being damaged by the stone.

Pile Driving

After the mat was securely anchored
(Continued on next page)

You can take General MacArthur's word for it!

"The Red Cross has done a 100 per cent job in this theatre. Mathematical limitations alone prevent my saying the Red Cross services here have been more than 100 per cent."

—General Douglas MacArthur

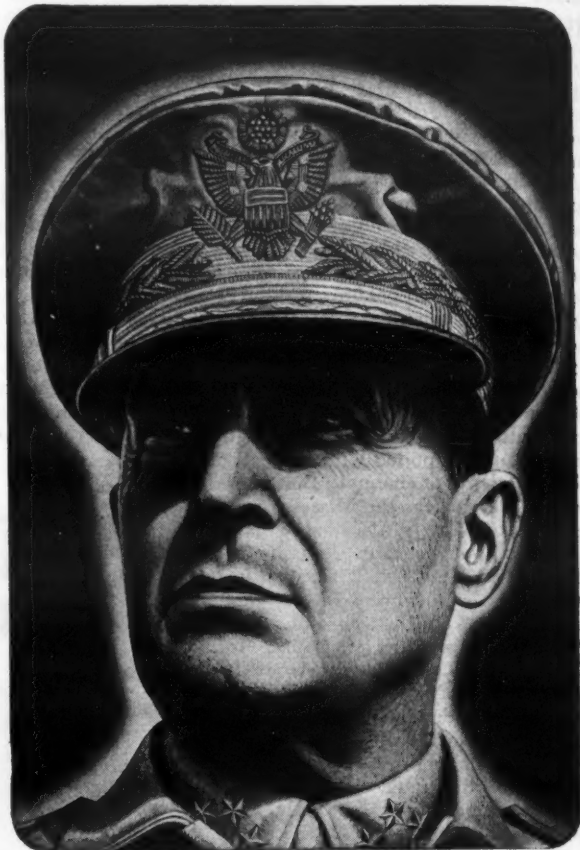
SO SPEAKS a distinguished eye-witness of your Red Cross in action. General MacArthur saw the Red Cross at your fighting man's side, all through the gruelling months of the Pacific campaign. He saw Red Cross men under fire on D-Day beachheads—sweat it out in foxholes—follow the men with candy, cigarettes and other comforts right up to the firing line.

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erans' hospitals and in faraway lands overseas need its comfort and cheer now, as they did when the bombs were bursting. And as our servicemen return to civilian life, your Red Cross must lend them a helping hand.

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Wood-Pile Dikes Aid Channel Maintenance

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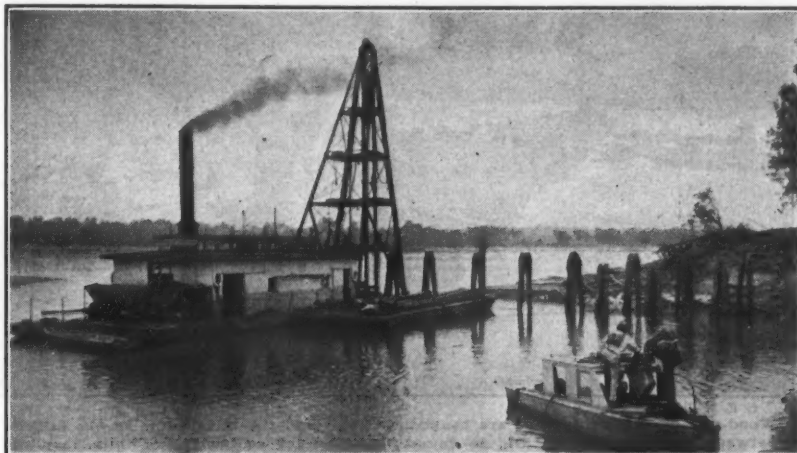
in position, the piles were driven to form the dike, which consists of two rows of pile clusters, three piles to a cluster. The parallel rows are 5 feet apart while the clusters are on 12-foot centers and are staggered for greater rigidity. The clump spacing in these dikes may vary from 6 to 20 feet, depending on the depth of the water; the deeper the water, the more pile clumps are needed. At this point the water is from 6 to 12 feet in depth.

Cypress and pine piles, about 44 feet long with 8-inch tips and 20-inch butts, were trimmed to a 4-inch point at the tip, and to a 10-inch size at the butt in order to fit under the plate of the pile hammer. In some cases, so as to get the greatest cross section of pile mass at the bed of the river, piles up to 39 feet in length are driven with the tips down, while piles over 40 feet long are driven with the butts down. The average penetration was 20 feet.

Pile Barge Rig

The U. S. Engineers' pile-driving rig No. 108 has a steel hull of 5/16-inch plates, measuring 88 x 25 x 5 feet, with a 30-inch draft. Built in 1927, the rig has a steel A-frame at the bow, supporting 60-foot leads made of steel channels with a 20-inch clearance in which moves a Vulcan No. 2 11,000-pound hammer. The hammer takes up about 11 feet in the leads and has a ram which is lifted 30 inches by steam power and drops by gravity on the pile.

The driver is operated by steam from a 120-hp boiler located near the stern. The boiler has 10 tubes, 6 inches x 22 feet; delivers steam at 135-pound pressure; and carries enough coal in a pocket at the stern for four or five days' work. Starboard of the boiler is an evaporator which supplies pure drinking water from the river, while on the port side is a pump which forces water to the pile jetting line at 200-pound pressure. Additional equipment in the boiler room are an injector, which forces river water to the boiler under pressure, and a steam-turbine 15-kw generator to supply electricity for lighting.



C. & E. M. Photo

The St. Louis District Office of the U. S. E. D. used this pile-driving rig No. 108 in repairing wood-pile dikes along the Illinois shore of the Mississippi River after severe damage caused by flood in 1945.

At the bow directly behind the leads is a 3-drum American hoist; one drum is for lifting the piles into the leads,

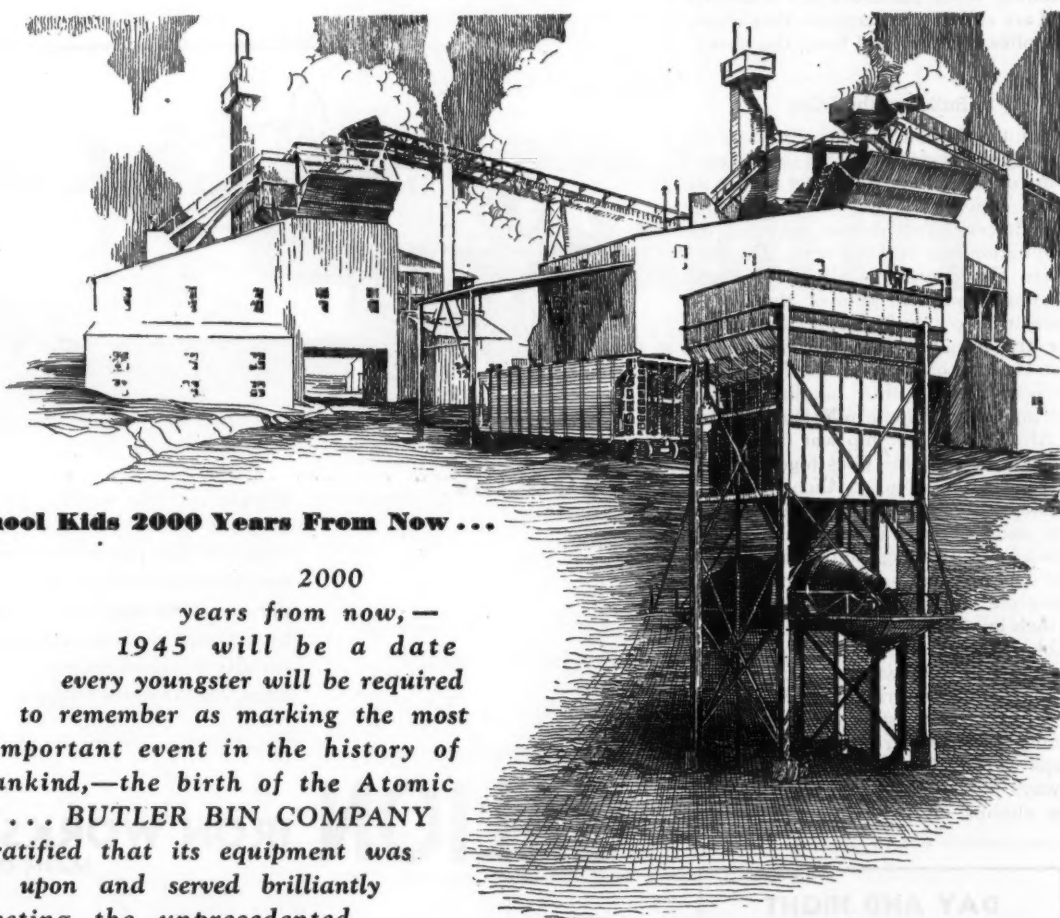
another raises the hammer, while the third drum elevates the 55-foot jet pipe which can be lengthened to 75 feet if

deep water is encountered. To this hoist the breast swing lines are connected when the rig has to be moved from the bow. The cables on these breast lines run out through chocks placed on the deck, and are anchored either to a pile clump already driven, or to one of the anchor piles to the port and starboard. The movement of the barge is also controlled through two stern cables running through an American hoist at the very stern of the rig, and is usually anchored to a tree on the bank at the starboard side, and to a pile clump to port, since the driver always works with the bow pointed upstream. All hoist engines are steam-operated.

Driving Crew

The nine-man crew of the rig is directed by the foreman in charge, who gives his orders to the operating engineer seated directly behind the leads as he runs the hammer and the different bow hoists, watches the steam pressure, and tells the fireman when to turn the

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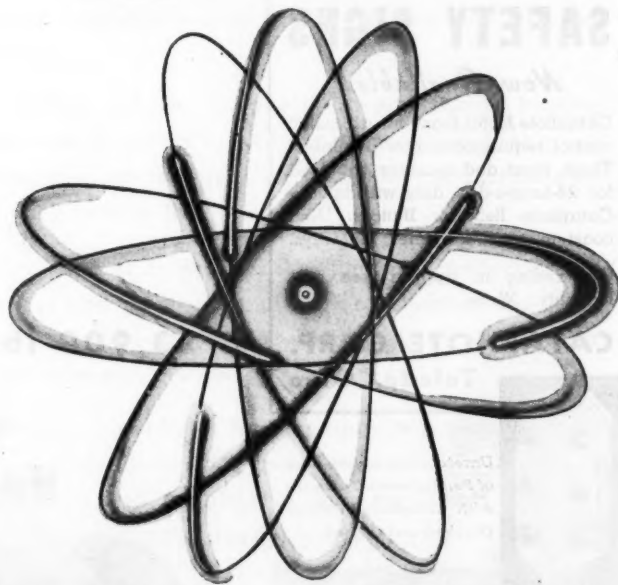


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Wood-Pile Dikes Aid Channel Maintenance

(Continued from preceding page)

jet pump on and off. The fireman maintains steam, shovels coal, and removes the ashes. The leadsman, as the name implies, watches the pile leads from the platforms on the A-frame, and sees that the head of the pile is always under the hammer. Winding the cables on the hoist engine drums is the work of the spoolman, as the foreman orders the rig to be moved on the breast line or other operations involving shifting the lines about. He also runs the jet, which is a 3-inch line reduced at the end to a 1¼-inch nozzle which is kept 3 to 4 feet below the point of the pile, thereby greatly increasing the speed of driving. Another skilled member of the crew is the stern-engine man who, from his station at the starboard bow, runs the stern swing line by remote control. The remaining three members are unskilled, and are called pile shaggers; they clump the piles together and hang the stringers.

Building the Dike

For the 50 feet of dike adjoining the shore, the piles were driven to an elevation corresponding to 20 feet on the St. Louis gage, while the rest of the line was driven 5 feet deeper, piercing the foundation mat in the driving. On short dikes the driver usually drives and clumps about five sets of three piles each in a row, and then does the same for the parallel row. On longer jobs two rigs are often used, one for driving each row, with a third banding rig following, doing all the pile clumping.

After a 3-pile clump was driven, the shaggers pulled the piles together with a rope on the hoist, then passed a ¾-inch cable around the piles near the top, and tightened it up with the hoist, using a "come along" so the cable would not slip as it was being tightened. Four complete turns were made, with a 6-inch boat spike securing each turn of cable. Pile stringers were then strung up between the rows of clumps, a 2-row dike using one stringer, and a 3-row dike using two stringers, with each clump fastened firmly to a stringer. Laps were at least 6 feet long, and are always put on the downstream side of the clumps. A good line on the pile



C. & E. M. Photo
Wood-pile dikes of this type are constructed out into the Mississippi in the section between Cairo and Alton, Ill., to cause deposition of sediment and thus keep the channel clear.

dike was obtained by using two ranges, 50 to 100 feet apart, set up on the shore.

With this nine-man crew an average of 30 piles was driven in an 8-hour day. The man-power shortage prevented the working of two shifts, but a night

watchman was used to keep steam up in the boiler so no time was lost in the morning. Because of the muddy waters, the boiler had to be washed out every two weeks. Auxiliary equipment included two flat barges with steel hulls,

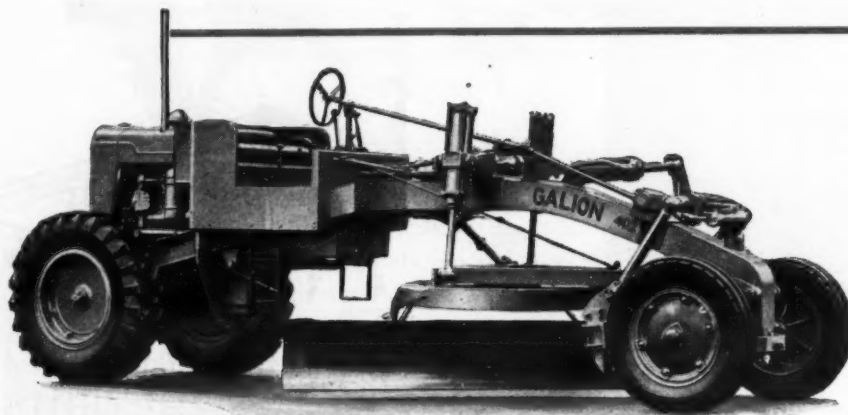
measuring 55 x 16 x 2½ feet, which were used in building the mats and also for storing piles. The piles to be used are sometimes assembled in the form of a raft, held together with cables, and floated alongside the driving rig.

Shore Connection

The dike was extended 75 feet into the bank with a row of posts set in holes dug with a post-hole digger. As the digger could reach a depth of only 6 feet, the posts were jettied an additional 3 or 4 feet into the ground. The bank was then graded to a smooth even appearance by a Northwest 1½-yard dragline with a 55-foot boom, which worked along the bank on the conventional crawler treads as much as possible. When the bank was too unstable and the water was deep inshore, the dragline operated from a steel barge, 160 x 34 x 6 feet.

A 6-inch layer of crushed stone was then placed along the shore portion of the dike for its full length, and the

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8800 lbs.

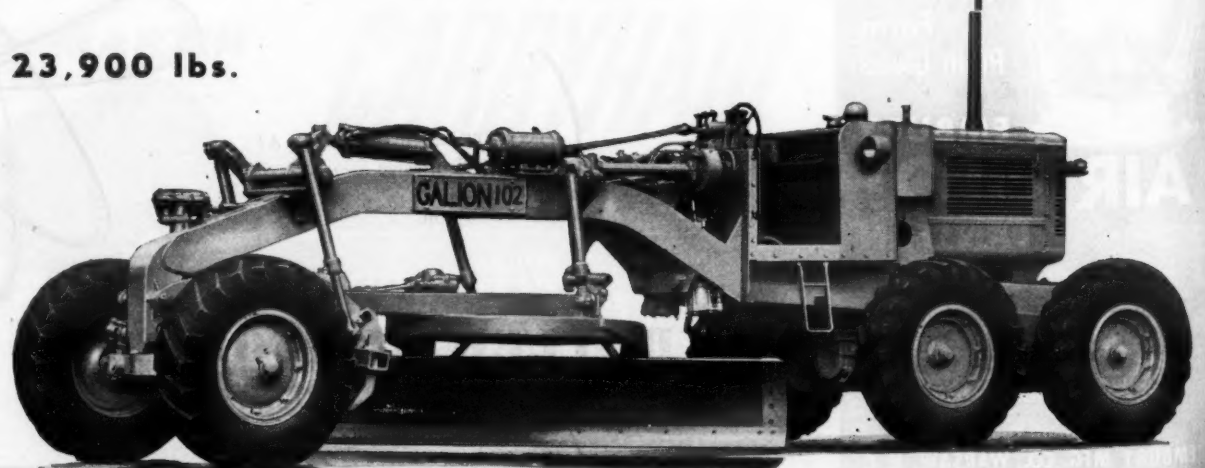
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Unretouched photograph of Pennsylvania Turnpike with Cataphote Niteway Outliner installation.

Wood-Pile Dikes Aid Channel Maintenance

(Continued from preceding page)

same width as the foundation mat. On top of this went a course of larger stone, each weighing between 3 and 80 pounds, and with no dimension longer than 12 inches. The gradation of the crushed stone was as follows:

Sieve Size	Per Cent Passing
3-inch	100
2-inch	80-90
1-inch	35-70
1/2-inch	0-20
3/4-inch	0-2

Screen Mattress

The screen mattress to hang from the pile dike was then constructed on the barge in a manner similar to the foundation mat, with the exception that the 1 x 4-inch body boards were laid flat and not woven under and over the weavers, and that the space between boards was only 2 inches. When this screen mat was hung on the upstream row of pile clumps with two turns of 3/8-inch strand cable secured to each clump by boat spikes, it results in the deposition of a considerable part of the silt load carried in suspension by the water passing through the barrier.

The mat extends not only to the bed of the river but has an additional depth of 10 feet which lies on the bottom with its end curving upstream. Close to the shore, the screen mat is also weighted with stones as an anchorage. Stones were then dropped around the pile clumps to fill up the holes made in the main-line mat when the piles were being driven through it.

Stone and lumber used in the dike reconstruction were purchased locally, either at St. Louis, Ste. Genevieve, or Cape Girardeau, Mo., and brought to the site by barge. The piles were bought in southern Louisiana, shipped by rail, and delivered by contract at certain designated pile points about 30 to 40 miles apart along the river, from where they were barged to the construction site.

Dike Contract

The work on the Massman Construction Co. contract was performed by a pile-driving barge rig, with a separate barge for clumping and banding the piles with a hand-operated winch. The major items covering the construction of ten dikes for a total length of 6,005 feet included:

Lumber	666,000 MBM
Piling	149,500 lin. ft.
Stringers	8,300 lin. ft.
Stone for dike and mattress	8,500 cu. yds.
Grading, bank	2,600 cu. yds.
Hand-cast one-man riprap	1,400 cu. yds.
Crushed stone, shore blanket	700 cu. yds.

The contract was inspected for the U. S. E. D. by W. W. Hitt, and H. B. Thompson was Superintendent for the Massman Construction Co. of Kansas City, Mo. J. B. Butler is Head of River Regulation Construction at the St. Louis, Mo., Engineer District, while A. A. McFadden is Engineer in charge of the service base covering river and harbor projects. J. V. Rentschler is in charge of contract inspection and permits.

Col. L. B. Feagin is District Engineer at St. Louis, and Lt. Col. J. A. Adams is Deputy District Engineer. The Executive Officer is Lt. Col. E. H. Shutt, while Lt. Col. W. F. Lawlor is Chief of the Engineering Division.

Bar Lifts 5 Tons

One man can raise a 5-ton object with a new lifting bar developed by the Arnolt Motor Co., it is said. The bar is especially recommended for relocating machinery, and for use wherever heavy objects must be lifted onto dollies or otherwise moved. Made in two sizes, for 1 and 5-ton capacities, the bar has a

hardened-steel roller built into its heel to give extra leverage. Interchangeable toe plates are available in notched, straight-edged, and rubber-coated straight-edged styles.

A descriptive circular and prices of the Rol-R-Lift may be obtained by addressing the Arnolt Motor Co., 666 Lake Shore Drive, Chicago, Ill., and mentioning this notice.

New Mixers Illustrated

The streamlined post-war Rex mixers, Models 6S, 3 1/2 S end-discharge, and Skipper, are illustrated and described in a new booklet published by the Chain Belt Co. Small sketches emphasize the new machine innovations, and large illustrations show the main mechanical features. Two pages are devoted to a composite set of specifications for the three mixers.

Copies of the bulletin, No. 480, may be obtained by writing direct to the company at 1666 W. Bruce St., Milwaukee 4, Wis.

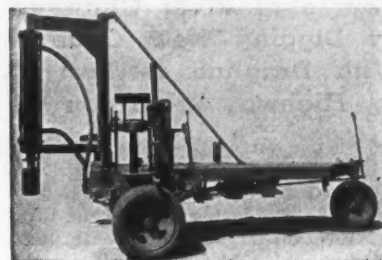
Junior CONCRETE RAPID PAVEMENT BREAKER

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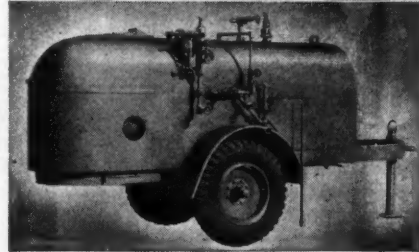
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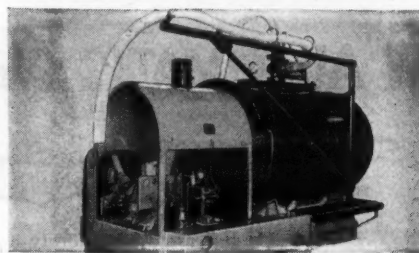
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A New Macadam Road Improves Access Route

Course of River Changed By Digging New Channel With Dragline as Part of Highway Relocation

THE old narrow 16-foot gravel road with a thin bituminous top which has been the principal access to Fort George G. Meade, in Maryland, from the town of Laurel on U. S. 1 has recently been replaced with a 24-foot macadam pavement built entirely on new location, which necessitated changing the course of the Little Patuxent River. On the north and east, modern access highways tying into state and Federal through routes leave the grounds of the large military reservation, which is about 24 miles equidistant from Washington and Baltimore. On the west, however, State Route 216, running a little over 4 miles from the western boundary of the Fort to Laurel, was in need of improvement after the heavy traffic during the war period. Two years ago a portion of this road was rebuilt for a mile out of Laurel, while this recent contract picked up at the east end of that improvement and continued over 3.17 miles of new location to the western gate of the Fort which now can be reached over first-class highways.

A contract for the new road was awarded to the Williams Construction Co. of Middle River, Md., by the Maryland State Roads Commission, and clearing of the right-of-way was started on June 21, 1945. The trees and brush were cleared out mostly by hand labor, assisted by a Caterpillar D8 tractor-dozzer which removed the stumps and heavy roots. The principal item in the contract was the nearly 200,000 cubic yards of material comprising the roadway excavation, the excavation for the new river channel, and borrow material that had to be dug and moved.

For two reasons a new location for the road was decided upon: first, so that traffic to the post could be maintained on the existing highway during the construction period, an important factor especially during the war; and second, in order that a better alignment could be obtained. To achieve the desired alignment, the course of the Little Patuxent River flowing south and east to Chesapeake Bay had to be altered. The countryside is low and fairly flat around Fort Meade and no excessive cuts and fills were necessary. The soil is a sand-clay silt with thin strata of gravel through it, but no rock was encountered.

Earth Moving

For earth-moving equipment, the contractor selected four 10 to 15-yard bottom-dump Euclids for the longer hauls, which averaged 1,200 feet, and a Bucyrus-Erie Model 52 2-yard shovel to load them. Good haul roads were maintained over the new location by two Caterpillar power graders, permitting the big rubber-tired self-powered wagons to roll along at an average speed of 20 mph. For the shorter hauls up to 750 feet in length, a fleet of five LeTourneau 10-yard scrapers pulled by Caterpillar D8 tractors was used. Their speed averaged 5 to 6 miles per hour and they were helped in loading by another Caterpillar D8 acting as a pusher. The material was spread and leveled by two additional Caterpillar tractor-dozers, a D8 and a D7, and an Allis-Chalmers HD-14 tractor-dozzer. With all this heavy equipment, both rubber-tired and crawler-tread, operating over the fills, excellent compaction was obtained in 8-inch layers without having to use rollers.

Not enough material was available

within the roadway limits to bring the fills up to grade so the contractor resorted to five borrow pits fairly evenly spaced over the 3-mile job, and in no case being a greater distance than 200 feet from the road. Both LeTourneau scrapers and Euclids were employed in hauling from the borrow pits, the choice being made on the same basis of haul lengths as was used in moving earth along the roadway sections. The final grading of the sub-base material was done by the power graders which had been employed in shaping up the haul roads.

Drainage Structures

The placing of the drainage structures proceeded concurrently with the grading operations, this work being done



C. & E. M. Photo

For the longer hauls, averaging 1,200 feet, on a 3.17-mile highway relocation job in Maryland, the Williams Construction Co. used bottom-dump Euclids loaded by a Bucyrus-Erie 2-yard shovel.

under a subcontract to Edward H. Nunn of Baltimore, Md., formerly Construction Engineer of the Maryland State Roads Commission. Excavation for the

pipe was done by a General crane equipped with a 30-foot boom and a 1/2-yard clamshell bucket. When the
(Continued on next page)



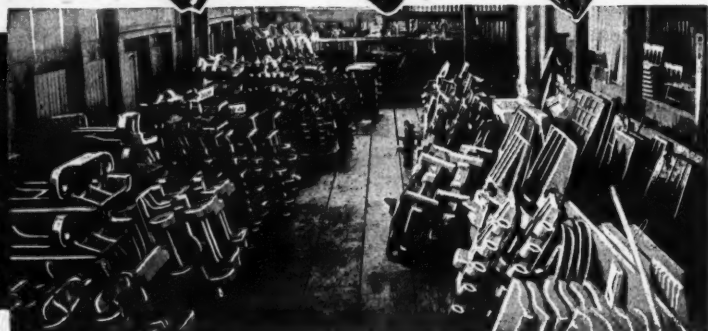
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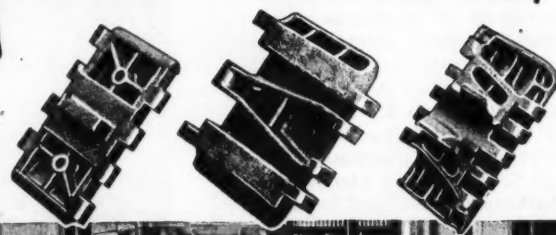
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A New Macadam Road Improves Access Route

(Continued from preceding page)

trench was dug, a pipe hook replaced the bucket to lay the reinforced-concrete pipe which varies in size from 12 to 60 inches. This type of pipe is used as transverse drains in the fill sections, being laid for the most part on the original ground line. In the cut sections 6 and 8-inch perforated concrete underdrain was set by hand. A crew of ten was used in this phase of the work, consisting of a foreman, crane operator, and eight laborers to lay the pipe.

River Relocation

In relocating the Little Patuxent River, a straight channel 1,600 feet long was dug through marshy woods to take the place of the winding ox-bow course of the sluggish stream. A path had to be hacked and cut through the underbrush for a half mile from the existing road so that a dragline could be taken to the excavation site. The clearing gang, with the assistance of a Caterpillar D8 tractor-dozzer, cleared the path for the Lorain 78 dragline with a 60-foot boom which dug the new channel with a Page 1 1/4-yard bucket. The big machine worked on a set of five timber mats, each composed of four 12 x 12's, 20 feet long, lashed and spiked together.

This ditch, which roughly parallels the new location of the highway, is 60 feet wide at the bottom, has 2 on 1 side slopes, and varies in depth from 6 to 10 feet, with an average water-level width of 90 feet. The dragline worked lengthwise along the channel, making half the width of the cut at a time, and cast the excavated material on the banks. To prevent water from backing up in the cut, a section of earth, about 6 feet wide, was left every 150 feet to act as a dike. When the excavation was completed, with the exception of small gaps at each end adjacent to the existing river channel, the material from the cut was loaded by the dragline, using a Haiss 1-yard clamshell bucket, into the scrapers which hauled the material to both sides of the river section to be filled in. When the end gaps were removed and the river diverted into the new channel, a tractor-dozzer pushed the earth banks into the former channel.

Macadam Pavement

Before laying any macadam pavement on the sub-base of the roadway, a 2-inch layer of stone screenings was spread over the dirt in any location where the soil appeared to be in need of such stabilization. The gradation of this insulation material was as follows:

Sieve Size	Per Cent Passing
3/4-inch	100
1/2-inch	90-100
No. 100	10-30

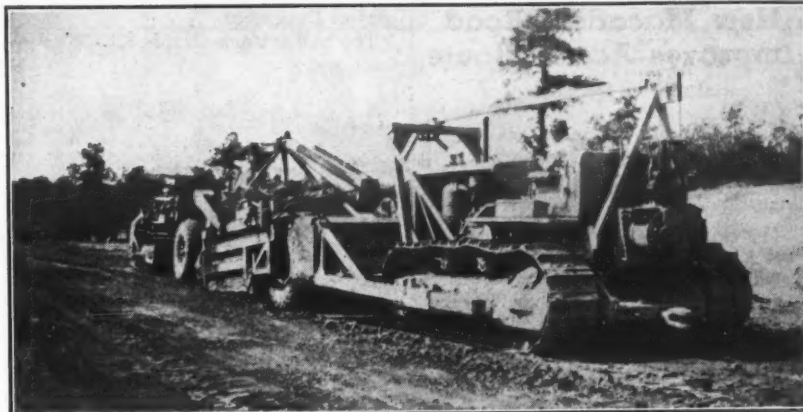
Then a 5-inch base course of slag with the following gradation was laid in a single layer:

Sieve Size	Per Cent Passing
3 1/2-inch	100
3-inch	90-100
2-inch	35-70
1-inch	0-15

The voids in the base were filled with a choke course of slag screenings which was rolled and watered, after which the base course was covered with a layer of smaller slag compacted by rolling to a 3-inch depth. The gradation on this upper course follows:

Sieve Size	Per Cent Passing
2 1/2-inch	100
2-inch	90-100
1 1/2-inch	35-70
1-inch	0-15
3/4-inch	0-5

This layer was then given an asphalt penetration application of 1 3/4 gallons to the square yard and a layer of chips spread over the surface in a quantity just to fill the surface voids. Rolling was then resumed and continued until the material was compacted and the surface was thoroughly bonded. This



C. & E. M. Photo

A fleet of LeTourneau 10-yard scrapers, pulled by Caterpillar D8's and aided in loading by another D8, moved the earth on hauls up to 750 feet on the Williams Construction Co. contract.

surface was then swept clean of all loose slag and a seal coat of approximately 1/2 gallon of bituminous binder to the square yard was applied and covered with No. 3 slag, rolled slightly

and broom-dragged. Approximately one week after the first seal coat, and traffic had had an opportunity to use the roadway, a second seal coat was applied. (Concluded on next page)

On the job---

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A New Macadam Road Improves Access Route

(Continued from preceding page)

plied, using from 0.1 to 0.2 gallon of bituminous material per square yard, covered with No. 7 aggregate, and rolled.

The new 24-foot pavement has a crown of 1/8 inch to the foot and is flanked by 10-foot shoulders which have a slope of 1/2 inch to the foot, and are topped with 6 inches of gravel for the 8 feet adjacent to the pavement. The outer 2 feet is of natural soil.

Quantities and Personnel

Working a 10-hour day, the contractor moved an average of from 2,500 to 3,000 cubic yards of material daily, and employed at the peak a force of about fifty men, half of whom were used in land clearing, the rest being equipment operators, oilers, and other skilled labor. The pavement was completed and the new road opened to traffic in the early

part of December.

The major items in this \$232,381 contract were:

Excavation for roadway	142,800 cu. yds.
Excavation for river change	33,000 cu. yds.
Borrow material	16,300 cu. yds.
Macadam base course, 5-inch	45,100 sq. yds.
Penetration macadam surface, 3-inch	45,100 sq. yds.
Bituminous material, penetration macadam	121,800 gals.
Reinforced-concrete pipe, 12 to 60-inch	2,300 lin. ft.
Perforated concrete underdrain, 8-inch	4,700 lin. ft.
Perforated concrete underdrain, 6-inch	1,400 lin. ft.
Concrete gutter	1,200 sq. yds.

This Fort Meade to Laurel road is located in Anne Arundel County in District 3 of the Maryland State Roads Commission of which Robert M. Rein-dollar is Chairman, and Wilson T. Ballard, Chief Engineer. E. G. Duncan is District Engineer and J. G. Myers was Resident Engineer on the project. James O. Ridgely was Superintendent for the Williams Construction Co., the prime contractor, while E. H. Nunn, subcontractor on the drainage system, directed his own forces.

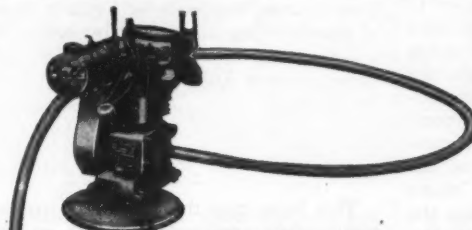
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Protecting pavements on highways, airfields, parking lots, equipment yards, garage floors, and other locations against oil and gasoline drip through the application of Jennite J16 is discussed in a folder issued by Mainte-

nance, Inc., Wooster, Ohio, maker of this surface seal coat and other maintenance products. Various applications of the sealing material are shown and directions for its use are given.

This leaflet, IT-102, together with other information, may be obtained by writing direct to the producer and mentioning this notice.



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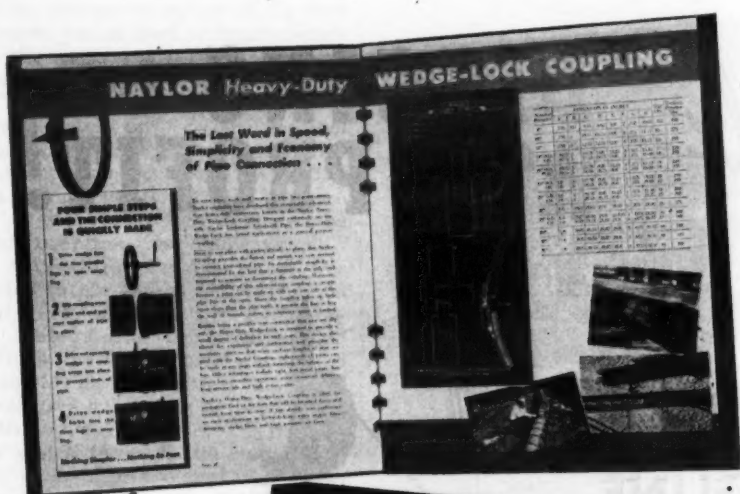
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C. & E. M. Photo
To help solve the man-power shortage on an Indiana highway job last summer, Betty Wilkerson, wife of one of the roller operators, served as a flag girl.

Rock Asphalt Used To Surface Highway

(Continued from page 1)

0.08 gallon to the square yard, applied by a pressure distributor made from a 779-gallon tank mounted on a truck chassis, with a Wayne pump at the rear end driven by a Hercules gas engine. The usual procedure was to apply about 1½ miles of prime for the full width before spreading the two layers of binder, consisting of stone mixed with asphalt, which was then given a bituminous seal coat and covered with a wearing surface of rock asphalt.

Binder Course

To prepare the binder course, the contractor set up a plant on the outskirts of Crawfordsville on a siding of the C.C.C. & St. Louis Railroad, and dried the stone aggregate in a Barber-Greene drier before mixing it in the Barber-Greene plant with RC-5 80 to 120-penetration asphalt. Six storage tanks were used for the asphalt required on the job, and they were heated when needed by a 75-hp coal-burning boiler. For the binder course the asphalt was heated to 200 degrees F before mixing with the stone, but this temperature dropped by the time the binder was transported to the job site, and it was laid as a cold-mix. The gradation of the No. 9 stone in the binder was:

Sieve Size	Per Cent Retained
¾-inch	0
½-inch	10-35
No. 4	85-100
No. 30	99-100

RC-5 asphalt, 4½ to 6 per cent

The binder material was truck-hauled to the road and laid in lanes, half the pavement width, by two Adnua Black Top Pavers in two layers of 1 and 1½ inches average depth, which varied according to the amount of material needed to remove the excessive crown in some parts of the road. The total weight of this binder was about 225 pounds to the square yard, and it compressed to an average thickness of 2 inches under a Huber 10-ton 3-wheel roller. Two pavers were employed, laying alternate lanes each day, so that time would not be lost in having to move the machine back at the end of the day's run to pave the adjoining lane on the following day.

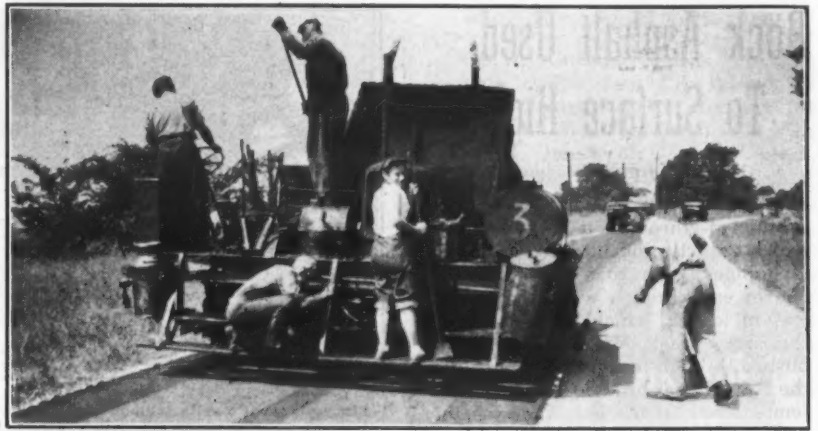
After the entire road was covered with the binder material and every part allowed to cure for at least five days, the surface was topped with a seal coat applied half width at a time. The seal coat consisted of 0.12 gallon of RC-3 80 to 120-penetration asphalt to the square yard, followed by 8 pounds of No. 12 stone chips per square yard, put on by a mechanical spreader. The gradation of the stone chips was as follows:

Sieve Size	Per Cent Retained
No. 4	20-50
No. 8	65-100
No. 30	96-100
No. 100	99-100

The stone for this job came from the France Stone Quarry at Greencastle, Ind., and was shipped in bottom-dump cars 40 miles over the C.I. & L. railroad to the contractor's plant where it was unloaded by a Barber-Greene conveyor belt and either stockpiled or dumped directly into the trucks. Four Ford trucks were used to transport the binder material, stone chips, and the rock asphalt from the plant site to the road. Several refineries in the vicinity of Indianapolis supplied the different grades of asphalt for this contract.

Rock-Asphalt Surface

The sandstone rock asphalt used in the surface course was mined in southern Kentucky, and transported in barges up the Green River to the plant of the Kentucky Rock Asphalt Co. at Bowling Green, Ky., where it was loaded into gondola cars and shipped 125 miles over the L & N railroad to the plant at Crawfordsville. The natural rock asphalt was shipped cold, just as it was taken from the ground, each car



C. & E. M. Photo
L. P. Cavett & Co. used two Adnua Black Top Pavers to lay both binder and Kyrock rock-asphalt surfacing on a 10-mile highway paving contract in Indiana.

holding from 60 to 65 tons. Before this rock asphalt, or Kyrock as it is known, could be used, it first had to be heated to a temperature of from 200 to 235 degrees F. This heating also served to

dry out the material which, according to specifications, could not contain more than 4 per cent moisture by weight.

Heat was furnished by the previously (Concluded on next page)

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Rock Asphalt Used To Surface Highway

(Continued from preceding page)

mentioned boiler, the hot steam being conducted through a 1½-inch pipe which branched off into two other 1½-inch pipes, each 10 feet long. At the end of each branch were eight jets, 5 feet in length, which were stuck into the rock asphalt. When the steam was pushed through this total of sixteen jets, the Kyrock was brought to the required temperature in the car, and was then unloaded and placed in the trucks by means of a Bucyrus-Erie crane with a 32-foot boom and a ½-yard clamshell bucket.

Before the rock asphalt was laid on the road, the seal coat was primed with a light application, 0.05 gallon of RC-2 to the square yard, a single lane at a time. Then the Kyrock was spread at a 170-degree-F temperature by the Ad-nun pavers to a loose depth of ¾ inch in the same manner as were the binder courses. The weight of the rock asphalt averaged 60 pounds to the square yard, and compacted under rolling to a depth of ¾ inch. The initial rolling was done by a Buffalo-Springfield tandem 7-ton roller, in order to get sufficient compaction for the material to hold the heavier Huber 10-ton 3-wheel roller which followed for a secondary rolling. No vehicles were permitted to ride over the surface for five days, at the end of which time the road was opened to traffic.

The average production was the unloading and spreading of five carloads or about 300 tons of rock asphalt in a 10-hour day, which meant an average length of 1½ miles of single-lane pavement. This work was done with a small crew both on the road and at the plant. The crew at the paver consisted of the operator, two men adjusting the screed bar, one man to clean the trucks, one finisher or lute man, and two laborers with shovels to carry material back from the paver and spread it around at the direction of the finisher. This finisher had two long-handled lutes, one 3 feet and the other 5 feet long. With these tools he smoothed over any irregularities in the surface finish. Additional personnel on the road included the two roller operators, and the driver of the water tank truck, who transported water for the rollers and paver from hydrants in towns along the road in a 550-gallon tank mounted on a Ford truck. Two other laborers for general utility work made an even dozen in the road gang. A crew of six worked at the plant, including a crane operator, winch operator, boiler man, and three laborers to clean out the rock asphalt from the cars.

Girls at Work

Great difficulty was experienced in rounding up the necessary 18-man working force for the operations at the plant and on the road, and it was equally hard to find the needed flagmen to station at each end of the work to maintain traffic. Offers of employment were extended to some "over-age" men, but these were turned down since it meant having to give up some of the benefits of an old-age pension. The problem was solved by hiring the wives of the two roller men to act as flag girls. One was 20 and the other 30 years old; the latter was the mother of a 12-year-old girl.

Further help from the distaff side came in the person of 16-year-old Clara Mae Long, who spent the summer vacation before entering her senior year at Marion, Ind., high school helping her father, Superintendent Everett Long, in various jobs about the project. Clad in rolled-up blue jeans, jaunty blouse, and pigtailed tied with a red ribbon to



C. & E. M. Photo

Sixty-year-old Leslie Allison and 16-year-old Clara Mae Long, daughter of Superintendent Everett Long, set paver guide stakes on an Indiana paving contract for which it was extremely difficult to round up sufficient man-power.

match her lipstick, this attractive, sun-tanned bobby-soxer filled in with a rake or a hoe when needed on the paver, staked out the line for the paver to follow with her 60-year-old partner, Leslie Allison, and also drove a pick-up truck around the job, hauling materials and supplies.

Quantities and Personnel

Despite the handicap of insufficient labor, the 10-mile paving job was finished after four months of work. Other contractors in Indiana also experienced difficulty from the man-power shortage, one even placing a "men wanted" sign beneath the "road under construction; travel at your own risk" markers in an effort to attract migrant help.

The major items included in this contract were:

Bituminous prime material, RC-2	24,500 gals.
Bituminous seal material, RC-3	18,400 gals.
Cover aggregate	620 tons
Bituminous-coated aggregate	15,320 tons
Rock asphalt	3,680 tons

Everett Long was Superintendent for the contractor, L. P. Cavett & Co. of Lockland, Ohio, and H. C. Thurston was Project Engineer for the Indiana State Highway Commission. This project was handled by the Maintenance Division which is headed by Charles T. Miser, Superintendent of Maintenance. L. L. Walker is Field Engineer of Maintenance.

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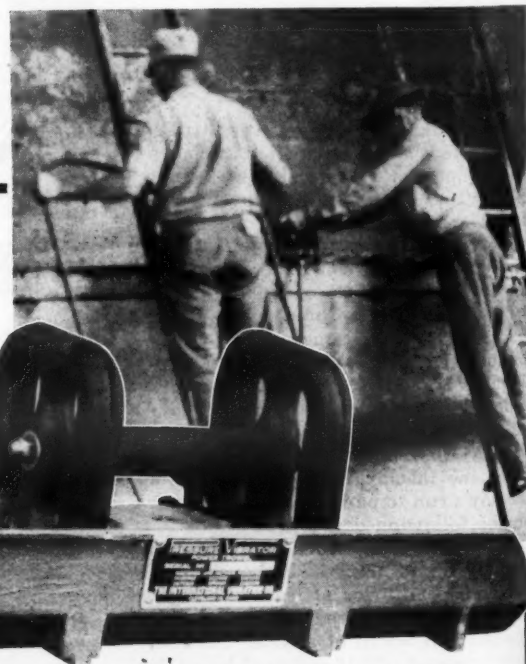
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More Lighting Seen For Highway Safety

At least 4,000,000 light fixtures will be needed for new and replacement traffic safety lighting in the U. S. during the next 10 years, a recently completed survey of lighting conditions indicates. Made by Dr. A. F. Dickerson, Manager of General Electric's Lighting Division, the study leads to the conclusion that this program must be carried out if the rising tide of automobile accidents is to be curbed.

While daytime accidents have decreased due to "outstanding accomplishments in engineering, enforcement, and public education", night accidents have increased "because improper visibility more than offsets these accomplishments", the report says. For every person killed in daylight accidents, two persons are killed at night, the survey shows.

The estimated need for the next 10 years is based on survey findings that most accidents occur on 4 per cent of

500,000 miles of designated highways, and on 10 per cent of 300,000 miles of city streets. Making up the total estimate are such items as 1,000,000 new fixtures for 25,000 miles of traffic arteries; 500,000 fixtures for 5,000 miles of freeways; and 600,000 new lighting fixtures for 15,000 miles of highway approaches to and through communities.

As an illustration of the effect of insufficient lighting, the survey pointed to the New York City wartime dim-out, where in 1941-42, fatal day crashes dropped from 124 to 89, while night fatalities mounted from 167 to 276. Detroit, said to be the world's best lit city, reduced night-accident deaths from 58 to 18 in 18-month periods before and after the inception of a new lighting program.

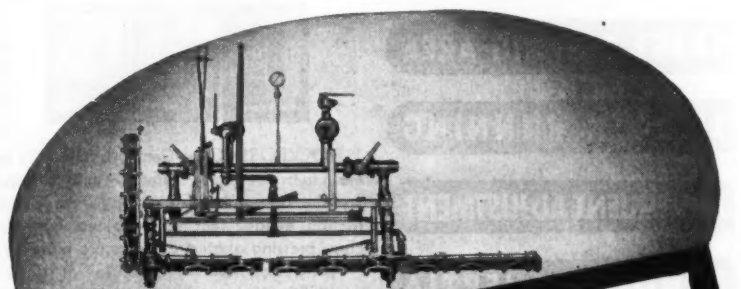
White Reassumes Duties

Following separation from duty with the Army Air Force, Captain W. McKean White, Jr., has resumed his post

as Vice President of the White Mfg. Co., Elkhart, Ind. He served two years in England and France and was engaged primarily with air-sea rescue duty. Mr. White will aid his father in the expanding activities of the firm, which produces front-end loaders for tractors, concrete vibrators, asphalt heating kettles, and other products.

Missouri AGC Officers

Otto W. Knutson, Kansas City, has been elected President of the Associated General Contractors of Missouri for 1946. E. W. Menefee, Sedalia, is Vice President; James M. Joyce, Keokuk, Treasurer; and E. C. L. Wagner, Jefferson City, Secretary-Manager.



Improved Material Control THROUGH ROSCO SPRAYBARS

Above: Type "F" full-circulating spraybar handles highest temperature bitumen and keeps hot material circulating immediately back of the nozzle valves in either folded or extended position.

Left: Type "H" header-circulating spraybar has right and left cut-off valves in header—quick cut-off at nozzles by reverse suction. When folded, extensions cut off automatically—a patented feature.



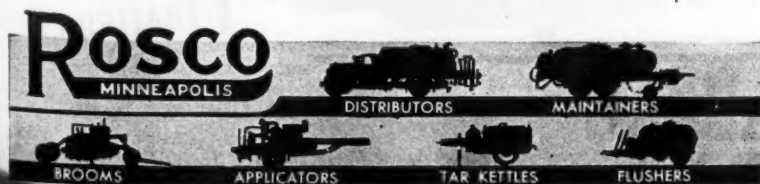
ROSCO ORIGINATED the folding type spraybar, now universally accepted and proven through years of outstanding performance, and used on all Rosco Bituminous Distributors. Rosco spraybars are designed with oversize piping and without internal gadgets or inside tube restrictions. This provides free and unobstructed flow of materials to nozzle—insuring uniform pressure over length of bar. When folded, Rosco bars provide more than ample road clearance, and may be lifted when traveling to maintain a 21" ground clearance. When extended, a center safety breakpoint eliminates breakage of bar caused by any road obstruction, allowing each half of the bar to pivot without spillage—a two-fold economy feature.

THE ROSCO METHOD follows a basic hydraulic principle, is automatic in action and provides control from rear platform—guarantees operating pressure at spraybar nozzles. No pump metering method is used—requires only normal pump speed for light or heavy application. This control, plus multiple directional material flow, and built-in mechanical reverse suction, is possible with the Rosco Patented Seven Way Master Valve—mounted in front with pump and engine. Bitumen application rates are positively measured and uniformly spread, exclusive with Rosco.



For further information, contact your nearest Rosco dealer or write us.

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"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 75 KW—for stand-by, continuous duty, battery-charging, and portable uses. Write for literature, stating type of unit and capacity required.

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554 Nebraska Street Oshkosh, Wisconsin
Factory representatives strategically located throughout U. S. A. and Canada.

"U.S." ELECTRIC PLANTS



MECHANICS Roller Bearing Universal Joints

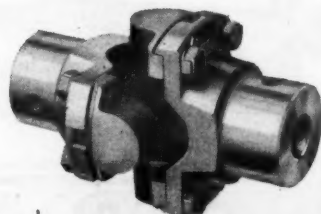
LIFETIME or ONCE-A-SEASON Lubrication Avoids Costly Delays

On construction jobs where there is a race against time, your machines will operate more reliably and with less time lost for servicing, if they have the LIFETIME or ONCE-A-

SEASON lubrication features of MECHANICS Roller Bearing UNIVERSAL JOINTS.

Available in single, double and close-coupled types in all sizes suitable for applications requiring from 200 pounds foot to 50,000 pounds foot torque.

Let our engineers show you how this and other advantages of MECHANICS Roller Bearing UNIVERSAL JOINTS will benefit your new or improved models.



MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2026 Harrison Ave., Rockford, Ill.

Precast Bridge Piles

(Continued from page 1)

pered operations so much that the bridges were not completed until early in 1946.

The bridges were built south of Midville on State Route 56 in eastern Georgia, partly in Emanuel and partly in Burke County. The longest bridge, 849 feet, is the northernmost, and crosses the main channel of the Ogeechee River with two 40-foot concrete-deck spans and three I-beam spans of 70, 85, and 70 feet. The latter are supported on concrete piers, while the rest of the bridge construction consists of 32-foot concrete decks resting on bents made up of five concrete piles which were precast at the rate of six every 10-hour day at the pile-casting plant.

To the south about 1,000 feet is the first overflow bridge, 576 feet long, and another 1,000 feet south of it is the second overflow bridge, 256 feet long. These overflow bridges were also designed with 32-foot concrete decks supported on concrete-pile intermediate and end bents. They were built across low-lying areas of the coastal plain, which during most of the year are not very wet. When the Ogeechee River rises, however, these spans are needed to handle the overflow which cannot be contained in the main channel at the long bridge since the waters spread out over the countryside as they drain eastward to the sea.

The three existing bridges with an 18-foot roadway were of timber-trestle construction, about 25 years old, and needed constant maintenance. This replacement of flooring, stringers, caps, and piles became increasingly difficult with the mounting shortage of lumber, and the construction of new concrete structures was urgently needed. The three new bridges are of the same type of construction and will sustain an H-20 loading. Since the piles serve as the foundation and piers to support the superstructure, no work could begin on the reinforced-concrete slab-and-girder construction of the bridge deck until the piles were cast, cured, and driven.

Steel Assembly for Piles

Consequently the contractor's first move was to set up a pile-casting yard in a cleared, flat area near the southerly bridge which was the first to be built. A wooden rack was erected on which the reinforcing steel for the piles was assembled. This rack consisted of a framework of 3-inch-diameter wood posts, about 5 feet long, which were placed in the ground in two rows, 6 feet apart, with posts every 10 feet. The tops of the posts were leveled off about 3 feet above the ground, and the posts in each row were connected at the top with 2 x 6's, about 12 feet long, which extended 3 feet beyond the posts on each side. The rack was securely cross-braced with other 2 x 6's.

Into the tops of these 2 x 6's beyond the sides of the frame, three notches were cut about 1 inch deep and 5 inches apart, into which the three 1-inch square reinforcing bars running the length of the pile were placed. As the piles varied in length from 25 to 45 feet, the rack for the steel assembly was built 50 feet long. When the three longitudinal reinforcing bars for one side were cut off at the proper length, hoops made of No. 6 wire were strung around the bars, and the additional long bars for the other three sides of the steel-cage reinforcement were attached to the hoops. This steel cage was then lifted by hand and placed on top of the rack where it was at a higher level for the easier assembly of the spiral steel which was then added.

Pile Forms

Alongside the steel assembly racks

were the wooden forms in which the piles were cast. In building these, the ground was first carefully leveled by hand, and 4 x 8 timbers, 22 feet long, were then placed on the ground 26 inches on centers. Running in the opposite direction, or lengthwise of the piles, were 2 x 6's, on top of the 4 x 8's, on 15-inch centers. Thus there was a 2 x 6 under each corner of the pile form. Across these 2 x 6's were strung 2 x 4's, about 18 inches long, spaced 20 inches on centers for the length of the pile, to support the bottom side of the form.

The bottom form was made of 2 x 8-inch tongue-and-groove center-match stock while the side forms were of lighter material, being 1 1/4 x 5-inch tongue-and-groove stock. The side walls were braced with vertical 2 x 4 studs on 18-inch centers, but one side was left off until after the steel cage was set in place. On this form bed nine piles were poured, the forms being assembled in groups of three, with a space of 1 foot between each of the forms in that group. The outside forms were braced with 2 x 6's driven into the ground every 24 inches.

The piles were built 16 inches square, with a 3-foot taper to a 5-inch square tip. When the forms were prepared, the steel cages were carried by several workers from the assembly racks and placed in the form and set on concrete blocks. For a 30-foot pile the weight of the steel was 800 pounds.

Concreting

Concrete for the piles was mixed in a Rex 10-S mixer set up near the forms. The sand and stone aggregate was loaded from an adjacent stockpile into rubber-tired wheelbarrows, pushed along a plank runway to a Fairbanks scale where the contents were weighed before being emptied into the skip of the mixer. Water for the mix was pumped from a small meandering stream by a 2-inch Marlow, while bag cement was added by hand after the aggregate was unloaded. After being mixed for an average of 2 1/2 minutes, the concrete was loaded into wheelbarrows which were pushed up a wooden ramp to the top of the forms, dumped, and vibrated by a Mall unit powered by a Wisconsin engine.

Before the concrete had set, a Richmond Tyscru threaded sleeve, with an eye bolt, was inserted into the upper side of the pile 6 feet from the bottom,

and a similar sleeve put in 6 feet from the top. Into these sleeves to a depth of 10 inches were threaded Richmond Tyscrus by which the piles could be picked up and removed from the forms by a Northwest crane. After finishing with a hand float, the piles were cured with Truscon Tru-Cure compound. When they were transferred to a stock-

pile, the eye screws were removed but the sleeves were left in the concrete. A working force of 20 men cast a maximum of six piles in a 10-hour day. A typical batch by weight was as follows:

Cement	188 lbs.
Sand	394 lbs.
Stone	564 lbs.

(Concluded on next page)

Specify ROCKFORD OVER-CENTER CLUTCHES

EASY OPERATION

HIGH TORQUE

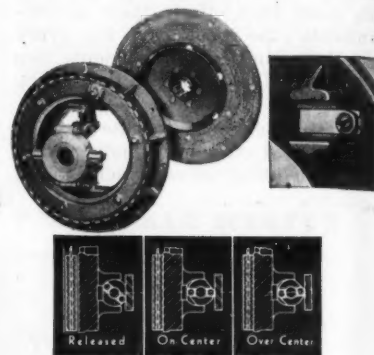
POSITIVE ENGAGEMENT*

LARGE DRIVING AREA

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INFREQUENT ADJUSTMENT

MINIMUM INERTIA



* ROCKFORD Over-Center CLUTCHES remain in or out of engagement — until, changed by the operator. The smooth, easy, anti-friction engagement — obtained by roller cams pressing against the pressure plate face — progresses from "release" to "on center" to slightly "over center" where the clutch locks itself in engaged or running position.

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It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning post-war products.



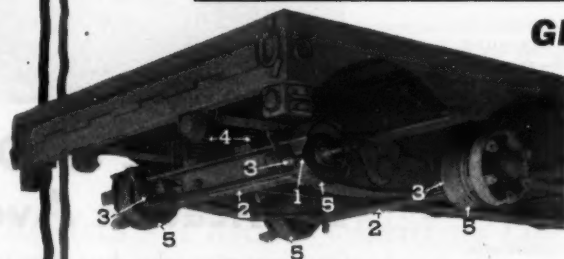
ROCKFORD CLUTCH DIVISION SOCO. WARNER
314 Catherine Street, Rockford, Illinois, U.S.A.



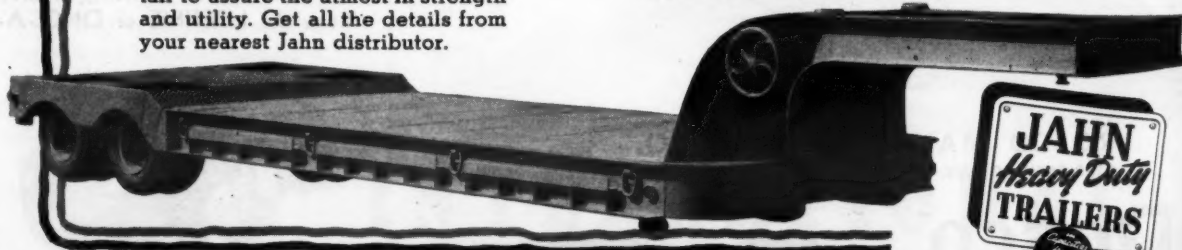
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1347 W. 37th Place, Chicago 9, Ill.

"Come to Trailer Headquarters"

Precast Bridge Piles

(Continued from preceding page)

To each batch was added 12 gallons of water. The gradation of the sand and stone used in the mix was as follows:

Sieve Size	Per Cent Passing	Stone
1 1/2-inch	100	100
1-inch	91	91
3/4-inch	56	56
1/2-inch	21	21
No. 4	100	3
No. 8	84	1
No. 16	16	...
No. 50	1	...
No. 100	...	...

The cement, sand, and stone were shipped by rail to Midville which is on both the Central of Georgia and the Georgia & Florida railroads, and hauled the remaining 2 miles to the bridge site in Ford trucks. The cement was shipped 355 miles from the Pennsylvania-Dixie Cement Corp. plant at Richard City, Tenn.; the stone came 105 miles from the Weston-Brooker Stone Co. at Camak, Ga.; and the sand traveled 85 miles from the Dawes Silica Mining Co. plant at Forest Pond, Ga. Unloading from railroad cars to trucks was done by hand. The reinforcing steel was hauled by trailer truck from Birmingham, Ala.

Pile Driving

The new bridges were built parallel to and just west of the old timber structures which continued to carry traffic during the construction operations. To speed the driving of the piles, the contractor had a special steel driving frame built by the Taylor Iron Works of Macon, Ga., which held all five piles of the bent at once, thereby insuring that the piles would be correctly spaced. The middle pile in the row is on the center line of the bridge with the other piles spaced 5 feet 10 inches on centers to each side. The two outside piles are battered 1 1/2 inch in 1 foot.

The template to space the piles was made from 8 x 8-inch timbers with five openings, 16 1/2 inches square, through which the 16-inch square piles were threaded. The pile-driving rig weighed 20 tons when outfitted with a Union 6-ton steam hammer and a 3-drum hoist powered by a 55-hp coal-burning steam boiler. It operated from a specially built timber falsework trestle and was skidded along by the use of its own hoist. The piles were driven to a minimum 35-ton bearing and cut off at grade by a jackhammer driven by a Worthington portable air compressor.

Superstructure

On top of the piles were built caps 2 feet 3 inches high, 2 feet 6 inches wide, and 26 feet 4 inches long, into which the piles extend 9 inches. The deck consists of five girders, one over each pile, 2 feet 4 inches deep and 1 foot 6 inches wide, supporting a 7-inch concrete slab for a roadway width of 26 feet, with a 2-foot safety curb on each side.

For the long spans on the main bridge, which cross the river channel, two-column piers were built instead of the pile bents. Twelve untreated timber piles were driven to support each pier footing which measures 10 x 7 1/2 x 10 feet deep. The piers are 18 feet high, and taper from 5 1/2 feet square at the base to a 2-foot square at the top. The piers are connected by a 15-inch-thick web wall and are topped by a standard-size cap.

On the 70, 85, and 70-foot I-beam spans, six beams, spaced 4 feet 10 inches on centers, were used. The four inside beams are 36-inch wide-flange 150-pound, and the two outside beams, 36-inch WF 170-pound.

Material for the approach fills came from borrow pits located alongside the road 1/2 mile south of the bridges, and was excavated by a Northwest 1-yard dragline and loaded into eight Ford trucks holding about 3 yards each.

After the material was dumped, it was spread in 6-inch layers by an Allis-Chalmers tractor with dozer, and compacted by a dual-drum sheepsfoot roller pulled by a Caterpillar Sixty tractor.

Quantities and Personnel

The major quantities involved were:

Concrete	3,350 cu. yds.
Reinforcing steel	\$91,000 lbs.
Excavation	9,400 cu. yds.
Timber piling, untreated	5,700 lin. ft.
Precast concrete piles	9,500 lin. ft.
Roadway borrow	62,402 cu. yds.

This bridge construction was located in Division 2 of the State Highway Department of Georgia of which G. W. Leftwich is Division Engineer. Vernon Smith is Assistant Division Engineer on construction, and was assisted by E. G. Andrews, Resident Engineer. G. T. McDonald is State Highway Engineer, with C. N. Crocker as Bridge Engineer and C. A. Marmelstein, Assistant Bridge Engineer. For the contractor, H. G. Smith, of Fitzgerald, Ga., Chester Smith was General Superintendent, while J. P. Byrd was Assistant Superintendent of the pile casting, and E. H. Brown, Assistant Superintendent on grading.

Rubber Products Dealer

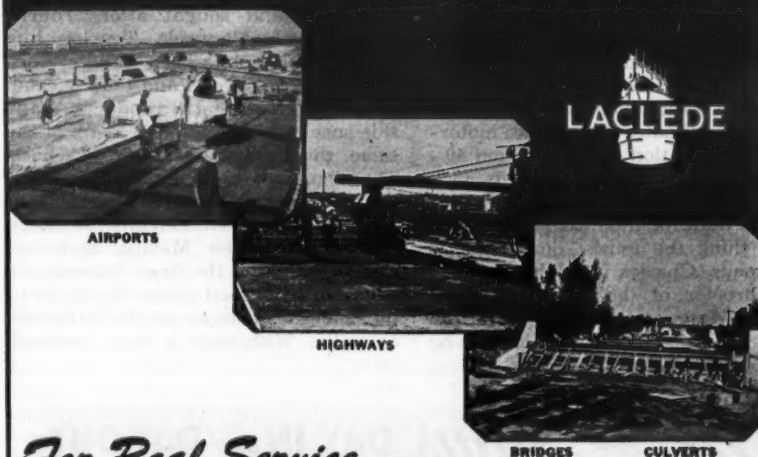
The formation of a new organization for the distribution of Hewitt rubber products and other items in sections of Ohio, Indiana, and Michigan has been announced with the incorporation of Bigelow-Gibson, Inc., at Toledo, Ohio. Samuel J. Gibson, erstwhile Hewitt representative for Ohio, is President of the firm, and Warren C. Bigelow, also a former Hewitt staff member, its Vice President.

Galion Representatives

Two ex-servicemen have been added to the sales staff of the Galion Iron Works & Mfg. Co., Galion, Ohio. Robert H. Burnup, formerly a Captain in the Corps of Engineers, is to serve as Gal-

ion's District Representative for Nebraska, Kansas, Oklahoma, Missouri, and southern Illinois. Former Air Corps Lieutenant Fred P. Vergon will represent the firm in Erie, Huron, Ashland, Holmes, Wayne, Coshocton, Ottawa, and Sandusky Counties, Ohio.

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For Real Service —

LET LACLEDE SUPPLY YOUR REINFORCING NEEDS FOR CONSTRUCTION OF HIGHWAYS, BRIDGES, AIRPORTS, CULVERTS AND DRAINAGE STRUCTURES. DELIVERY IS MADE TO THE JOB SITE WHEN NEEDED — COMPLETELY ENGINEERED AND DETAILED — READY FOR PLACING. A FULL LINE OF REINFORCEMENT IS AT YOUR SERVICE.

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Servicised—Bituminous Resilient Rail Filler Cuts Down Maintenance Costs for Both City and Railway Company by Eliminating Expansion & Contraction Damages.

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Through many long years of successful service our resilient Rail Filler has more than proved its inherent value to both city and Ry. company. Waterproofing spaces between rails and pavement have prevented infiltration, freezing, cracking and costly deterioration; also eliminating problems of vibration, noise, contraction, expansion and costly re-alignments. Street Railway Systems are possibly the largest users of Servicised Rail Filler, but it is also frequently used where interstate or interurban railroads run in contact with city pavements for distances of a few blocks to several miles.



SERVICISED PRODUCTS CORP.

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CHICAGO 38, ILL.

The Tourist Adds Much To a State's Prosperity

Americans are the most inveterate sightseers in the world, and our highways stretching across the continent from sea to sea and from Canada to Mexico have made it possible to satisfy our curiosity via motor car and bus. The wonders of this continent beckon as never before and the public is not going to let the invitation go unheeded. As soon as cars are available, the greatest tourist traffic the country has ever known will start to roll.

When will that be? It depends on reconversion, production, and other factors, but estimates place the motor-vehicle registration of 1950 around 40,000,000. Certainly the demand is such that the public will take cars as fast as they are built for the next few years.

One thing the tourist does want is good roads, Charles M. Upham, Engineer-Director of the American Road Builders' Association, points out in the feature "Down the Road" in which he

discusses these factors. As a class, tourists are among our greatest boosters for better highways. That is logical. After all, the tourist is out for a good time, and the better the highway, the more pleasant his outing. He will not only avoid a bad stretch of highway, but he will tell his motoring friends and acquaintances about it.

Thus the highway's condition may strike directly at the state's pocketbook, for tourist traffic is something to be nourished and sought after. Tourist trade is valuable trade. Tourists buy gas, oil, automobile parts and services, food and drink, hotel and tourist-camp accommodations, farm products, roadside snacks, souvenirs, and many of the same things that residents purchase. Then too, sections have their specialties in the tourist market: in Georgia, it is peaches; Florida, citrus fruits; Vermont, maple sugar; New Mexico, basketry; and so on along the line. An estimate made by hotel men places the value of the tourist business at \$6,000,000,000 annually. With such a sum involved,

state highway departments may well keep a watchful eye on the welfare and happiness of the visiting motorists.

It is significant that it is not always the big main highways that catch the tourist traffic. Routes leading to scenic spots or natural wonders may have been little used until the automobile came but they have been developed and maintained to meet the tourist demand. So it may be said that tourists have had a part in determining the location of certain roads.

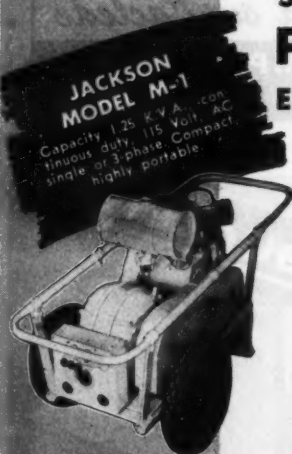
Naturally some states have more tourist allure than others, but practically all have something to offer, and each maintains a bureau to extol the reasons why the state should be included in tourist itineraries. To many people, California or Florida would seem to have more appeal than Pennsylvania. Yet in a recent bulletin, the

Keystone State placed a value of \$340,000,000 a year on its tourist business.

The best way to show tourists the welcome on your doormat is to build and maintain a proper system of state highways. Given adequate roads, the tourists will come. But remember too, Mr. Upham points out, that not all pleasure driving is touring in the sense of a transcontinental or interstate trip. In pre-war days, many millions of car-miles were run up in such practices as "just driving around in the evening to cool off", a trip to the next town for dinner, a visit to the old folks in another part of the county, and scores of similar jaunts and journeys that are part of our American way of life. This form of pleasure driving takes in all types of roads from the great state highways to the little-used farm-to-market roads and city streets.

Continuous DAY IN and DAY OUT Dependability

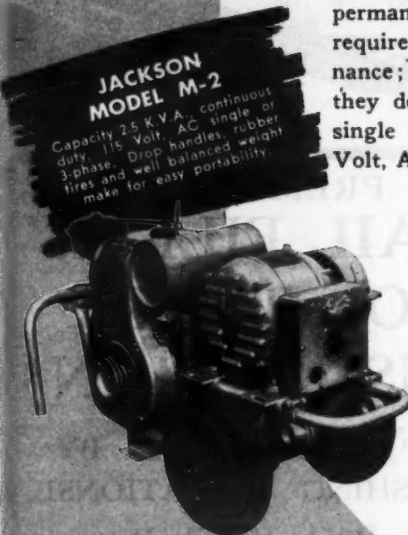
SUCH AS NO PORTABLE POWER PLANTS EVER BEFORE POSSESSED



JACKSON MODEL M-1

Capacity 1.25 K.V.A. continuous duty, 115 Volt, AC single or 3-phase Compact, highly portable.

You'll save yourself a wad of dough if the new Portable Power Plant you buy is one of the new JACKSONS. For these plants completely eliminate the time commonly lost when generator troubles arise. A gang held up for 15 minutes while a generator is adjusted or a brush replaced, in the aggregate means hours and dollars lost.



JACKSON MODEL M-2

Capacity 2.5 K.V.A. continuous duty, 115 Volt, AC single or 3-phase. Drop handles, rubber tires and well balanced weight make for easy portability.

Each JACKSON Plant has a new type, permanent magnet generator which requires no adjustment, no maintenance; is practically trouble-proof. And they deliver full rated capacity in single phase as well as 3 phase, 115 Volt, A.C. power. Add to this the fact that they incorporate the most reliable of engines and quality construction throughout and you have DEPENDABILITY such as no other Power Plant has ever possessed — the finest possible source of power for operating Floodlights, a wide range of power tools, concrete vibrators and vibratory screeds. Get the facts. Write NOW!



JACKSON MODEL M-4

Capacity 5 K.V.A. continuous duty, 115 Volt, AC single or 3-phase. Telescoping handles, standard auto tires and well balanced weight provide unusual maneuverability for a plant of this size.

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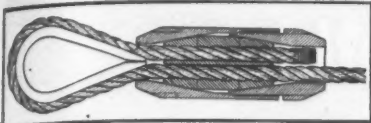
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World's Largest Builders of Heavy-Duty Air-Cooled Engines

The interior of every Wisconsin Engine casting is sprayed with red sealer. This adds nothing to the "beauty" of the engine but it is an important service and maintenance precaution — because it forever seals any loose particles from entering the oiling system and causing trouble. Small details such as this are important in safeguarding the engine user against equipment layups and expense which could otherwise result. You get dependable, heavy-duty serviceability when a Wisconsin Engine is on the job.

BUY all the Bonds you can . . .

KEEP all the Bonds you buy



The Cable-ox wire-rope clamp is easily assembled and is designed to provide a smooth strong small thimble loop.

New Wire-Rope Clamp Streamlines Splices

A new development for clamping wire rope and splicing cable, designed to hold a load beyond the safety factor of the rope itself and to eliminate loose ends to scratch or foul, has been announced by the Nunn Mfg. Co., 2125 Dewey Ave., Evanston, Ill. This Cabl-ox clamp is made of special high-tensile alloy steel which is cadmium-plated for weather protection and comprises five parts: a cap and barrel outer assembly, two half-round inserts which hold the rope strands, and a separator bar which goes between the inserts.

After slipping the cap and barrel on the rope, a loop is formed around the thimble, with just enough rope end left to go through the barrel. The latter is slipped over the double rope to make a tight loop against the thimble. The two half-round outer inserts are slipped

down in the barrel on the outer sides of the two ropes. The flat center separator is inserted between the two ropes; the cap is screwed into the barrel and tightened by hand and wrench. These steps are reversed to disassemble the clamp.

The Cabl-ox clamp is made in thirteen sizes for wire ropes having diameters ranging from 1/16 to 3/4 inch. Further details may be obtained by writing direct to the manufacturer and referring to this news report.

Safety Equipment Catalog

A wide variety of safety equipment, including many new products, is described in a new 178-page catalog issued by the Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa. The catalog, 6-B, is published in two editions, the usual 8 1/2 x 11-inch size, and the new pocket-size book, 5 x 6 1/2 inches, a miniature of the larger edition. An introductory section describes the research and plant facilities of MSA, one of the largest manufacturers of safety equipment.

Interested readers of CONTRACTORS AND ENGINEERS MONTHLY may secure copies of Catalog 6-B by addressing the company and mentioning this review.



"WE'VE FOUND THAT
STERLING'S
TUBULAR FRAME
NOW SERVES OUR
PURPOSE"

A LUMBER-SHORT
MARKET SHOWED
THE WAY!

Continuous steel tubing — more readily available than wood under today's conditions — has been a vital factor in STERLING'S reputation for quality and performance. The TUBULAR FRAME, reinforced to give additional strength at points where stress and strain are greatest, fortifies your STERLING Wheelbarrow for tough use and hard punishment under every condition. So, be sure to specify the STERLING tubular framed barrows on your next order.

Note: Deliveries of Sterling Wheelbarrows are being stepped up as rapidly as improvement in the raw material situation permits.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

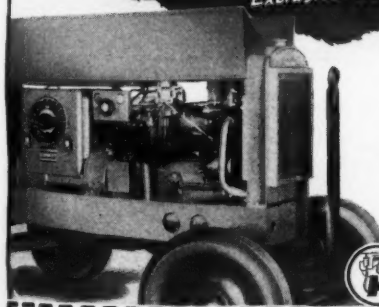
Sterling
WHEELBARROWS

Look for this Mark of
STERLING Quality



You'll be **GLAD** you bought a
HOBART Arc Welder

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Index to Advertisers

Aerol Products Company.....	52	Keystone Asphalt Products Company.....	26
Agerstrand Corporation.....	35	Kochring Company.....	67
Aircraft & Diesel Equipment Corp.....	22	Kotal Company.....	82
Allis-Chalmers Tractor Division.....	57	Laclede Steel Company.....	97
Alloy Steel & Metals Company.....	90	LaCrosse Trailer & Equipment Co.....	73
American Cable Division.....	55	Lansing Company.....	12
American Steel Scraper Co.....	57	LaPlant-Choate Manufacturing Co., Inc.....	28, 29
Anchor Coupling Co., Inc.....	55	LeTourneau, Inc., R. C.....	100
Anthony Company.....	79	Lewis Equipment Company, H. W.....	43
Ariens Company.....	62	Linn Manufacturing Corp.....	78
Armco Drainage & Metal Products Inc. and Assoc. Cor. Products.....	18	Lister-Blackstone, Inc.....	18
Athey Products Corp.....	16	Littleford Bros., Inc.....	78
Atkins and Company, E. C.....	31	Mall Tool Company.....	92
Austin-Western Company.....	23	Marion Machine Company.....	24
Barber-Greene Company.....	54	Marion Steam Shovel Company.....	62
Barco Manufacturing Company.....	70	Martin Machine Company.....	86
Barnes Manufacturing Co.....	90	McCaffrey, Inc., M. P.....	18
Barrett Division.....	68	McCaffrey-Ruddock Tagline Corp.....	54
Bay City Shovels, Inc.....	64	McKiernan-Terry Corp.....	80
Beebe Brothers.....	81	Mechanics Universal Joint Division.....	95
Bicknell Manufacturing Co.....	72	Michigan Power Shovel Company.....	83
Blackhawk Mfg. Company.....	71	Minneapolis-Moline Power Implement Co.....	76
Blaw-Knox Division.....	53	Mixer Mfrs. Bureau.....	81
Briggs & Stratton Corp.....	36	Mixermobile Manufacturers.....	11
Bucyrus-Erie Company.....	22	Monarch Road Machinery Co.....	58
Burch Corporation.....	60	Murphy Diesel Company.....	63
Butler Bin Company.....	87	Naylor Pipe Company.....	92
Caine Steel Company.....	42	Oliver Corporation.....	38
Carbon Dispersions, Inc.....	33	Onan & Sons, D. W.....	24
Carter Co., Ralph B.....	38	Owen Bucket Company.....	97
Case Co., J. I.....	63	Page Engineering Company.....	80
Cataphote Corporation.....	88	Pettibone Mulliken Corporation.....	8
Caterpillar Tractor Company.....	10	Piper Mfg. Company, R. J.....	46
Chicago Pneumatic Tool Company.....	60, 61	Punch-Lok Company.....	36
Chrysler Corp.....	42	Rapid Pavement Breaker Company.....	89
C. I. T. Corporation.....	59	Raybestos Div. of Raybestos-Manhattan, Inc.....	35
Cleaver-Brooks Company.....	89	Reilly Tar & Chemical Corp.....	56
Cleveland Rock Drill Div. Cleveland Pneumatic Tool Company.....	74	Rockford Clutch Division.....	96
Cleveland Trencher Company.....	92	Rodgers Hydraulic, Inc.....	66
Clyde Iron Works, Inc.....	30	Roebbling's Sons Company, John A.....	19
Complete Machinery & Equip. Co., Inc.....	19	Roeth Vibrator Company.....	66
Continental Rubber Works.....	39	Rogers Bros. Corporation.....	68
Cummer & Son Co., The F. D.....	64	Rosco Mfg. Company.....	95
Davenport Besler Corporation.....	65	Sasgen Derrick Company.....	91
DeSoto Foundry, Inc.....	91	Schramm Inc.....	77
Douglas Fir Plywood Association.....	46	Seaman Motors Company.....	5
Eastman Manufacturing Company.....	94	Servicised Products Corp.....	97
Economy Farms Corp.....	43	Shunk Mfg. Company.....	32
Electric Tamper & Equipment Co.....	98	Sinclair Refining Company.....	12
Ellicott Machine Corp.....	9	Smith Engineering Works.....	65
Embury Mfg. Company.....	87	Standard of California.....	17
Erie Steel Construction Co.....	79	Standard Oil Company of Indiana.....	33
Etnyre & Company, E. D.....	56	Standard Steel Corporation.....	14
Fawick Airflex Co., Inc.....	39	Sterling Machinery Corp.....	13
Foot Co., Inc., The.....	48, 49	Sterling Wheelbarrow Co.....	99
Ford Motor Company.....	34	Stoody Company.....	30
Fulton Bag & Cotton Mills.....	14	Syntron Company.....	36
Galion Iron Works & Mfg. Co.....	88	Templeton, Kenly & Co.....	74
Gar Wood Industries, Inc.....	44, 69	Texas Company.....	3, 20, 21
Gatke Corporation.....	79	Thew Shovel Company.....	7
General Excavator Co.....	93	Timco Manufacturing Company.....	37
GMC Truck & Coach Division.....	71	Trackson Company.....	15
Griffin Wellpoint Corporation.....	67	Tuthill Spring Company.....	83
Gulf Oil Corporation.....	27	Twin Disc Clutch Company.....	76
Haiss Mfg. Company, Inc., George.....	25	Union Iron Works, Inc.....	47
Hauck Mfg. Company.....	26	United States Motors Corp.....	95
Hayward Company.....	27	Victor Equipment Co.....	44
Heil Company.....	72	Vulcan Tool Manufacturing Co.....	25
Hetherington & Berner Inc.....	45	Walter Motor Truck Co.....	73
Highway Equipment Co., Inc.....	59	Warren-Knight Co.....	15
Highway Steel Products Company.....	32	Waukesha Motor Company.....	56
Hobart Brothers Company.....	99	Wellman Engineering Co.....	98
Huber Mfg. Company.....	41	White Mfg. Co.....	8
Hyster Company.....	9	Winpower Mfg. Co.....	69
Independent Pneumatic Tool Company.....	58	Wisconsin Hotel.....	82
Industrial Brownhoist Corp.....	76	Wisconsin Motor Corp.....	98
International Harvester Company.....	75	Wood Manufacturing Co.....	80
International Vibration Co.....	94	Woodridge Mfg. Company.....	52
Iowa Manufacturing Company.....	47	Worldright Mower Company.....	84
Isaacson Iron Works.....	13	Worthington-Ransome Constr. Equip. Div.....	40, 41
Jaeger Machine Company.....	85		
Jahn Company, C. R.....	96		
Kelly Machinery Company.....	84		

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2 OPERATE GRAVEL PITS

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3 SPREAD SURFACING MATERIAL

To place 47,000 yards of road surfacing material near Chenoa, Ill., Tournapulls loaded wet, pit-run gravel . . . hauled 3 miles over pave-

ment and spread in accurate 4 to 6" lifts, eliminating conventional shovel loading, truck hauling and special spreading tools. Prior to graveling, same Tournapull rigs handled grading on this job.

4 CUT DRAINAGE DITCHES

On roadwork near Alberta, Saskatchewan, Tournapulls cut ditches and handled rough sloping on shoulders. Job involved short hauls—under 1500' one way. One-man operated Tournapulls are all around dirtmovers . . . job-proved on all types of road maintenance and construction . . . economically handle widely-scattered large or small jobs.

5 MOVE JOB-TO-JOB

Tournapulls make self-powered, high-speed moves between jobs . . . travel anywhere without damage to road surface or interference with traffic. No trailer wait, no blocking or extra crew needed, no loading or unloading delay.

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